OCT 28 1909


# JOURNAL OF ELECTRICITY

## POWER AND GAS

**Devoted to the Conversion, Transmission and Distribution of Energy**

Entered as second-class matter May 7, 1906, at the Post Office at San Francisco, Cal., under the Act of Congress March 3, 1879

VOL. XXIII NO. 17 | SAN FRANCISCO, OCTOBER 23, 1909 | PER COPY, 10 CENTS



**Henshaw, Bulkley & Co.**

**ENGINEERS**

**Machinery Merchants**

San Francisco: 19 - 21 Fremont Street
Los Angeles: 262 So. Los Angeles St.
Oakland: 1436 Fifth St.

**OKONITE WIRE**

OKONITE
TRADE MARK
REG. U.S PATENT OFFICE.

**THE STANDARD for RUBBER INSULATION**

Okonite Tape, Manson Tape,
Candee Weatherproof Wire,
Candee (Patented) Potheads.

**The Okonite Company**
253 BROADWAY, NEW YORK

WILLARD L. CANDEE, PRESIDENT — GEO. T. MANSON, GEN'L SUPT.
H. DURANT CHEEVER, TREASURER — WM. H. HODGINS, SECRETARY

PARANITE

**INDIANA RUBBER AND INSULATED WIRE CO.**

Manufacturers of Paranite and Peerless Rubber Covered Wires and Cables
Underground Aerial, Submarine and Inside Use
Telephone, Telegraph and Fire Alarm Cables
All Wires are Tested at Factory JONESBORO, IND.

**Electric Appliance Company**
728 Mission St., San Francisco — Pacific Coast Agents

**Standard Underground Cable Co.**

MANUFACTURERS OF

**BARE AND INSULATED WIRE AND CABLES**

Chicago — Pittsburg — Philadelphia — Atlanta
New York — Boston — St. Louis — San Francisco

PACIFIC COAST DEPT. --- A. B. Saurman, Manager
First National Bank Bldg., San Francisco
Sub-Office—Los Angeles, Cal.

**Phillips Insulated Wire Co.**

PAWTUCKET, R. I.

"O.K." WEATHERPROOF
"PARAC" RUBBER COVERED

COMPLETE STOCKS CARRIED BY
OUR PACIFIC COAST AGENTS

California Electric Co. LOS ANGELES — Electric Appliance Co. SAN FRANCISCO — Western Electric Co. SEATTLE

**Specify....**

**BROOKFIELD GLASS INSULATORS**

**The Standard**

**PACIFIC METER CO.**

MANUFACTURERS OF

Wet and Dry Gas Meters, Station Meters, Provers, Gauges, Etc.

301 SANTA MARINA BUILDING
California and Drumm Sts. — San Francisco

**VULCAN** ..... Refrigerating and Ice Making Machinery

MANUFACTURED BY

**VULCAN IRON WORKS**

Office: 702 Atlas Bldg., 604 Mission St.
Works: Francisco and Kearny Streets — San Francisco


FOR INDEX TO ADVERTISEMENTS SEE PAGE EIGHT

# THE NECESSITIES OF THE ELECTRICAL TRADE

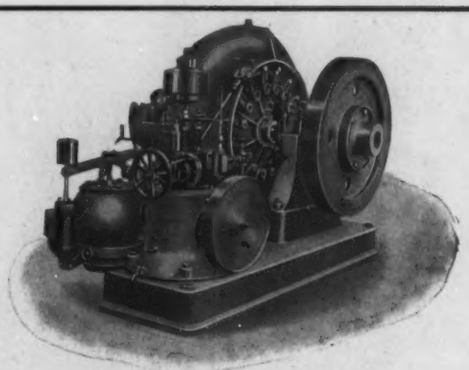
Up to Date Stock
Shipped Day Ordered
No Substitutions

TRY US

## Standard Electrical Works

Six Sixty-Nine Mission Street

SAN FRANCISCO



PELTON-FRANCIS TURBINE AND GOVERNOR

**Francis Turbine Water Wheels**

of any capacity contracted for and installed

Write for Catalog and List of Operating Plants

**THE PELTON WATER WHEEL CO.**

1011 MONADNOCK BLDG., SAN FRANCISCO, CAL.

84 WEST ST., NEW YORK CITY

## Bryan-Marsh Tungstens

| | | | | | |
|---|---|---|---|---|---|
| 25 watt | ---------- | Clear | $ .80 | Frosted | $ .85 |
| 40 " | ---------- | " | .90 | " | .95 |
| 60 " | ---------- | " | 1.25 | " | 1.32 |
| 100 " | ---------- | " | 1.60 | " | 1.70 |
| 150 " | ---------- | " | 2.25 | " | 2.40 |

Voltages 100 to 125. Obtain Discounts from

**California Incandescent Lamp Co.**

671-73 Mission St., San Francisco Kearny 1077

## New Weston Eclipse Direct Current

SWITCHBOARD AMMETERS
MILLI-AMMETERS and
VOLTMETERS

Are of the "Soft-iron" or "Electro-magnetic" type, but they possess so many novel and valuable characteristics as to practically constitute a new type of instrument.

Their cost is exceedingly low but they are remarkably accurate, well made and nicely finished instruments and are admirably adapted for general use in small plants, the cost of which is frequently an important consideration.

Correspondence Concerning these New Weston Instruments is solicited by the

**Weston Electrical Instrument Co.**

WAVERLY PARK, NEWARK, N. J.

San Francisco: Frank E. Smith, 682-684 Mission St.

New York: 114 Liberty St.

LONDON BRANCH: Audrey House, Ely Place, Holborn
BERLIN: Weston Instrument Co., Ltd., Ritterstrasse 88.
PARIS, FRANCE E. H. Cadiot, 12 Rue St. Georges

No. 61000

No. 61672

# WEBER

## Receptacles
OR
## Wall Sockets

**No. 61000** is one of a new line of Porcelain Receptacles for Car use particularly, but equally valuable in many other places. It overcomes all the objections to the use of Removable Ring Receptacles.

The Brass Shell line contains all the valuable features of Weber Sockets, such as snap-shell, spring center contact, etc.

Always Specify **WEBER** Accept No Substitutes

FOR SALE BY

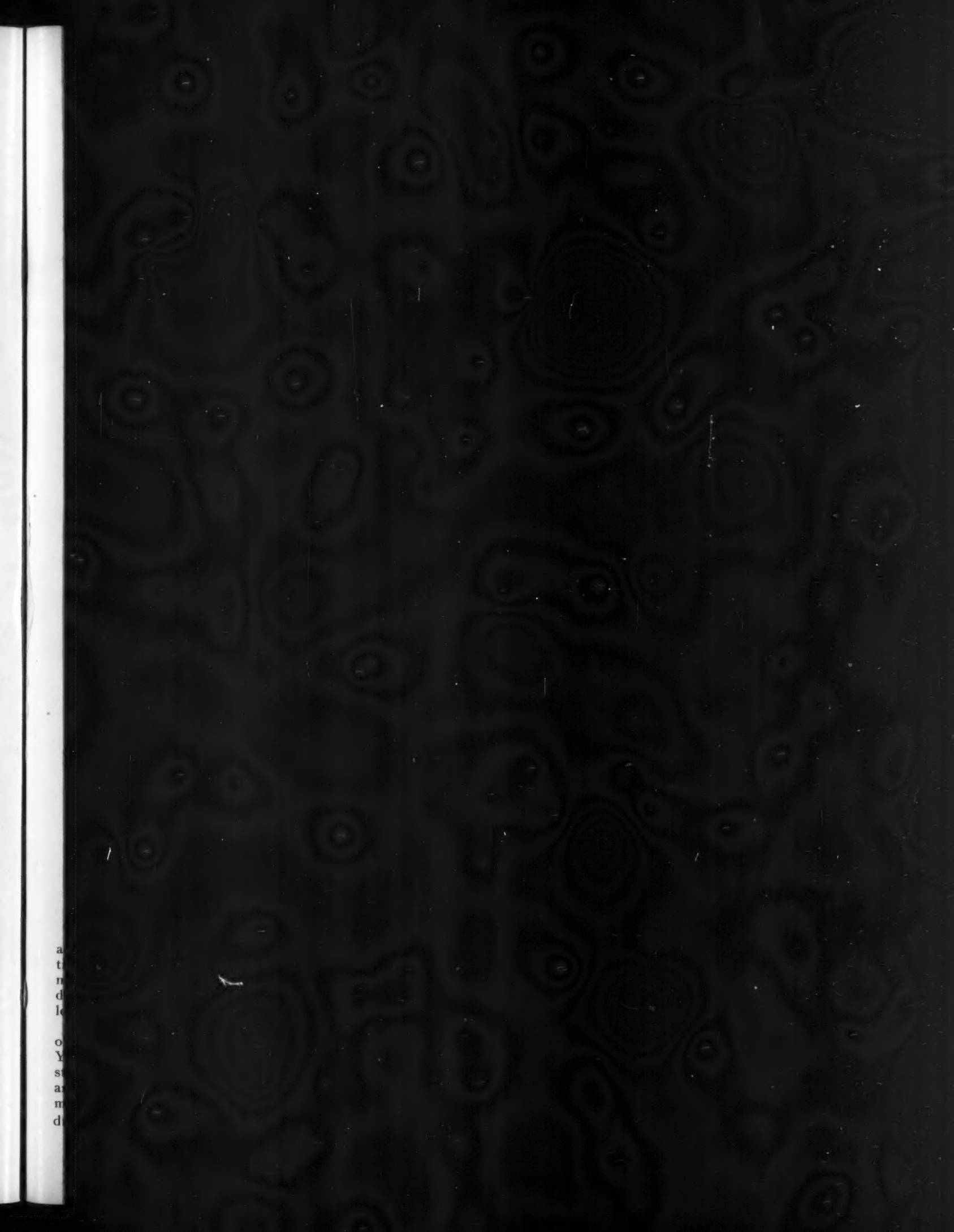
**All Jobbers of Electrical Supplies**

Throughout the United States

Send for Complete 1909 Catalog to

**HENRY D. SEARS, GENERAL SALES AGENT**

131 STATE STREET, BOSTON, MASS. 3



195037

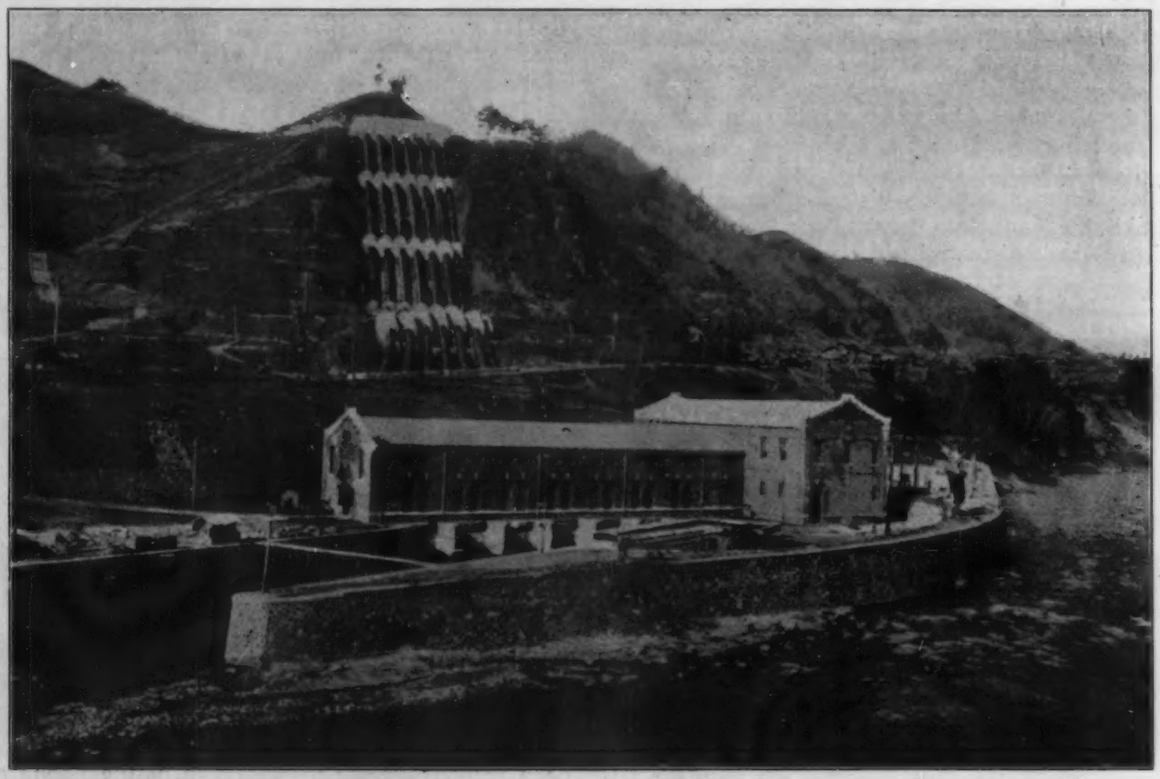
JOURNAL OF ELECTRICITY
POWER AND GAS
Devoted to the Conversion, Transmission and Distribution of Energy

VOLUME XXIII SAN FRANCISCO, OCTOBER 23, 1909 NUMBER 17

[Copyright, 1909, by Technical Publishing Company]

# THE TOKYO HYDRO ELECTRIC PLANT

The Tokyo Electric Light Company, with which has been amalgamated the Tokyo Electric Power Company, have issued a report in which they describe an interesting hydro-electric power plant, as illustrated on this page. While this has a capacity of 15,000 k. w. and while a 11,000 k. w. steam plant is also in operation, the growing demands of this progressive Japanese city have made necessary a further hydraulic development of 50,000 h. p. This work will require at least three years for completion.



Hydroelectric Plant of Tokyo Electric Light Company.

The river Katsura-gawa, from which the company obtains its water supply, has its source in the lake Yamanaka, which in turn is fed by the subterranean streams that drain through the sides of Mount Fuji and the surrounding ranges. The altitude and humidity being favorable there is no danger of the lake drying Furthermore, the land immediately surrounding the lake is of such a character that all flood water can be absorbed and there is, therefore, no chance for the lake to overflow, even after exceptionally heavy rainfalls. The river Katsura-gawa may in consequence be said to possess two qualifications necessary for hydro-electric purposes, namely, an unfailing supply of water and constant flow.

The company has one intake and one generating station on the river utilizing 750 cubic feet per second, producing 22,500 brake h. p. at the turbine shafts at an effective head of 345 feet. This is converted into electric energy of 15,000 k. w. at 6600 volts by means of three phase generators directly coupled to the turbine shafts. The pressure is stepped up to 57,000 volts and transmitted to the Waseda receiving station, 47 miles distant from the generating station.

At the receiving station the pressure is reduced to

11,000 volts and distributed to the city substations by means of underground cables.

The length of water course between the intake and the penstock chamber at Komahashi is 22,229 feet. The water course contains nine tunnels, the longest of which is No. 7 (3114 feet). The aggregate length of all the tunnels is 10,857 feet, and for the remaining distance of 11,372 feet the water runs in open canals. The gradient of the water course is 1 in 1200 in the tunnels and 1 in 2400 in the open canals, the difference of water levels between the intake and the penstock chamber being 13 ft. 9 in.: The machines installed in the generating station consist of double Francis turbines directly coupled with 3-phase generators. The turbines are of the double reaction type each being capable of giving 4500 brake horsepower, at 500 revolutions per minute. The generators are of three-phase revolving field type each having a capacity of 3900 k. v. a. at 6600 volt. The generating station contains six sets of these turbines and generators and two sets of exciters also directly coupled with Pelton water wheels, each of 265 brake horsepower at 600 r. p. m. Each exciter-generator has a capacity of 180 kilowatts. In addition there are 9 single-phase step-up transformers, each of 2000 kilowatts.

At the Waseda receiving station, 9 step-down transformers, each of 1800 kilowatts, are installed. Between the Komahashi generating station and the Waseda receiving station the energy is transmitted through a duplicate system of overhead lines supported by 4100 poles, the distance being 47 miles. Each of the 6 conductors consists of a bare copper cable of 18 strands of 105 mils in diameter.

## GERMAN AUTOMATIC TELEPHONE EXCHANGE.

Vice-Consul William Washington Brunswick of Chemnitz thus describes the working of an automatic telephone system that has been introduced by the Government: The first automatic telephone exchange system in Germany has been installed in Hildesheim by the Imperial German Postoffice, requiring no central to make the desired connection, each subscriber being his own exchange. The apparatus is like a clock, with indicating numbers. The Hildesheim subscriber's set, connected to the automatic exchange, is composed of a disk on which are to be found ten holes numbered from the bottom up, 0 to 9. These holes are just large enough to permit the insertion of the average person's forefinger, the holes being on a movable disk. When a subscriber rotates the disk by placing his finger in the hole 9 and rotates the disk, he sends the requisite impulse over the line to the central office, to move, in the case of number 951, the 100 switch nine steps, or, in other words, the switch picks out the ninth hundred. Similarly, when his finger is placed in the hole 5 and the disk is rotated, it is again rotated through a predetermined angle and sends back to the central office five impulses, which in turn move a final selector, which had in the meantime become connected to the 100 switch above referred to, five spaces, which will correspond to the 50's in this particular 900; and so again with the 1, until finally the apparatus in the central office has been connected through to line number 951 from the calling subscriber's line. It is not necessary for the subscriber to ring, inasmuch as this is also done automatically.

## PROMINENT CHARACTERISTICS OF LONG DISTANCE TELEPHONE LINES.[1]

BY A. B. DOMONOSKE AND B. M. WOODS.

The authors of this paper do not wish to pose as trouble men or as telephone engineers, nor do they expect to discuss herein anything not generally known by telephone men. Our excuse for writing, is that the transmission of power is emphasized much more strongly in most of our technical schools than is the transmission of intelligence.

Consequently, the power engineer is the one upon whom the majority of technical graduates fix their attention and mould their ways, that they may become like him. The power engineer who is accustomed to the handling and the annoyances of a 50,000 or a 100,000 volt transmission line is apt to look with disdain on the man whose system has for its initial voltage 20 to 40 volts direct current. In fact telephone engineering has been considered to consist in the building of beautiful switchboards and the making of complicated connections, or in other words, it is a science of expense and perseverance.

Therefore, in justice to the telephone engineer, we shall endeavor to show that many of the problems involved in the transmission of intelligence are worthy of being classed as engineering problems. To the student whose conception of a telephone system consists of a receiver, transmitter and operator, whose sole duty according to his idea is to report "line busy," we commend some of the following.

Up to now, whenever anything has been introduced in the way of transportation or power transmission that has interfered with the telephone lines, the engineers of the 'phone company have been compelled to provide means for their relief without any outside help. To be more exact, the telephone company has had to provide some means of annuling the trouble on their lines instead of the other people removing the cause. As to the justice or legality of such actions, as regards the power companies, we make no comment, except to state that, in our opinion, the time will come when there must be a definite understanding as to which, if either, of the companies must shoulder these burdens. The public demands transportation, power and phone service and will have them. Therefore, it will be the duty of either the engineer or the lawyer to see that these can be supplied without conflicting with each other.

The 600-volt direct current street-car system has been responsible for at least two of the phone company's difficulties; first, it put the ground return lines out of business; and, secondly, it has caused much trouble due to electrolytic action on the sheaths of the underground cables. However, both of these are now under control; the remedy for the first being a metallic return for the phone lines; and for the second, the grounding of the cable sheath to the negative bus bar of the railroad system.

A discussion of the principal physical properties and phenomena of the telephone line itself will perhaps be not inappropriate. This discussion is not intended to be rigidly technical, not to embody more than may be obtained from various papers on the subjects treated.

[1] California Journal of Technology.

In the first place, a telephone line is a low voltage, high frequency, single-phase transmission line. Following the nature or tone of the speaking voice, the transmitter sends forth along the line a current whose frequency varies probably from 100 to 12,000 cycles per second, but which, for simplicity, is in general considered constant at about 800 cycles per second. It is, then, of prime necessity to have a source of current capable of supplying a sine wave alternating current of 800 cycles per second, if laboratory determinations of instrument constants are to be made. Now, the telephone circuit is made up of many pieces of apparatus; which act as direct resistances, capacities, inductances, or as transformers; but it is customary in modern practice to express the impedance of each one of these pieces of apparatus in lengths of an ideal standard cable whose constants are known. Thus, a certain repeating coil may have its impedance expressed as 1.5 miles of standard cable, etc. It is found that when instruments, apparatus, etc., are put together aggregating a certain number of miles of standard cable in so-called equivalent impedance, a limit is reached beyond which conversation is impossible.

This limit to conversation is, in an unexposed line, due to two causes; first, the attenuation; secondly, the interference of higher harmonics or change of phase factor.

The attenuation depends on the fact that the wave which is transmitted along the line diminishes in amplitude as it proceeds. Moreover, this diminution follows a very definite law; that is

$$\frac{E_R}{E_S} = e^{-a_1 x}$$

where $E_S$ is the sending end voltage; $E_R$ is rhe receiver end voltage; $e$ is the base of natural logarithms, $a_1$ is a constant called the attenuation constant; and $x$ is the distance. This relation is, of course, based on the assumption that the wave is transmitted along a cable whose constants of resistance, inductance, capacity and insulation resistance are known; and which are uniform. Thus, we see that no attempt is made to solve the real combination of circuits, until it has been reduced to an equivalent amount of standard cable. The reason for this lies in the mathematical difficulties encountered in attempting any other method of solution.

The second cause, that of change of phase, is due to the effects of the constants of the cable on the current. Were the wave transmitted exactly a sine wave, this change of phase angle would not be particularly annoying; but if, as is usually the case, there be higher harmonics present, the velocities of the waves are affected and a wholly different wave from the one transmitted may be reproduced by the receiving end. A condition for an approximately distortionless cable has been obtained from the constants of the cable; and this condition has been realized by the use of Pupin Coils or coils of high inductance and low resistance. If these be introduced at certain intervals of wave length, the distortionless condition is approximated.

Thus, it is observed that the limit of speaking distance is normally due to two causes; the attenuation of the line, and the distortion of the line.

Mention was made of an unexposed cable or line. This term is used to distinguish between a line which passes, at any point of its route, in close proximity to a high tension power line; and one which does not.

The electrical troubles due to these power lines are due to electro-magnetic effects, electrostatic effects, and to leakage.

Cross-talk, or the action of one telephone line on another nearby, is due to the electrostatic effects. The remedy is to transpose the wires or in the case of cables to twist the conductors.

The action of a power transmission line on a telephone line may be due to a combination of all three of above effects. Usually it is due to electro-magnetic action. The usual remedy for power line disturbances has been to move the telephone wires from the vicinity of high tension wires.

The magnetic action is due to the fact that any wire carrying current is surrounded by lines of force. These lines of force are circular in form and are perpendicular to the longitudinal axis of the wire. The number of these lines and the area over which they spread is proportional to the strength of the current in the wire. Also the direction of the field, or direction in which a positive pole would tend to move in the field depends on the direction of the current in the wire. Therefore, an alternating current would set up a field of maximum intensity, which would decrease to zero, and then increase to a field of maximum negative intensity.

The rate of this would depend on the frequency of the current. Now by the fundamental law of induction, if a closed circuit cuts lines of force or if these lines of force cut the circuit, a current is set up in the circuit. The direction of this current being such that its field tends to oppose the field producing it. The e. m. f. produced depends on the rate of cutting or

$$e = \frac{d\phi}{dt}$$

Therefore, there will be current produced in any wire parallel to a wire carrying alternating or varying direct current. Consequently, a telephone line, especially a line with ground return, that is parallel to a power line will have currents produced in it which naturally will conflict with the talking currents. The remedy, of course, is to neutralize these currents or to move the line. The logical means of neutralizing this inductive effect is to apply to the telephone lines an e. m. f. that is always equal and opposite to the induced e. m. f. from the power lines.

Leakage and electro-static effects are usually of less importance, and give less trouble. The practice in building lines is, at present, to run from the high-tension power lines. If it is necessary to cross one, the crossing should be at as large an angle as practicable, and the telephone line should continue until at least 500 feet away if paralleling is necessary. No disturbance comes, in general, from crossings made in this manner, but paralleling at a less distance than 500 feet is usually disastrous to clear talking.

Thus, the main effects of high-tension power lines in proximity to telephone lines are seen to be exceedingly difficult to overcome, and are worthy of most careful and arduous study, because of their industrial and commercial importance. Moreover, the problem is by no means simplified by the advent of the single-phase railroad.

## REPORT OF EXPERIENCE DEPARTMENT PACIFIC COAST GAS ASSOCIATION.

BY R. P. VALENTINE.

Several years ago, the question of fuel for our water gas sets was quite a problem to us. The carbon was damp, making too much steam. The fuel was hard to handle, and we had a tremendous amount of hauling to do. In studying this problem, we hit upon a scheme which not only made the fuel easier to handle, pressed out the moisture to a certain extent and was more economical of operation, but greatly reduced the cost of hauling.

We took an ordinary brick press of plunger pattern and placed it on the ground near the water gas sets, removing the brick dies from the press and arranging the machine so as to mold one continual brick without cutting into regular lengths. We then placed an iron trough from the plunger die to the water gas platform, and at every plunge of the die, a cubical piece of carbon was formed and pushed up the trough to the platform. The length of this was only broken by falling over the end of the trough.

The only hauling we had to do, then, was from the pits to the apparatus. Our results from this machine were very satisfactory, and we are much pleased with it. This could be devised so as to have three or even four continual streams of carbon from this brick press, but for our water gas capacity, one seems to be plenty. This product also makes an excellent boiler fuel, and as we use no smoke making ingredients for a binder, there is very little smoke caused by its use.

### A CAPTIVE BALLOON AS A STEADY CONSUMER.

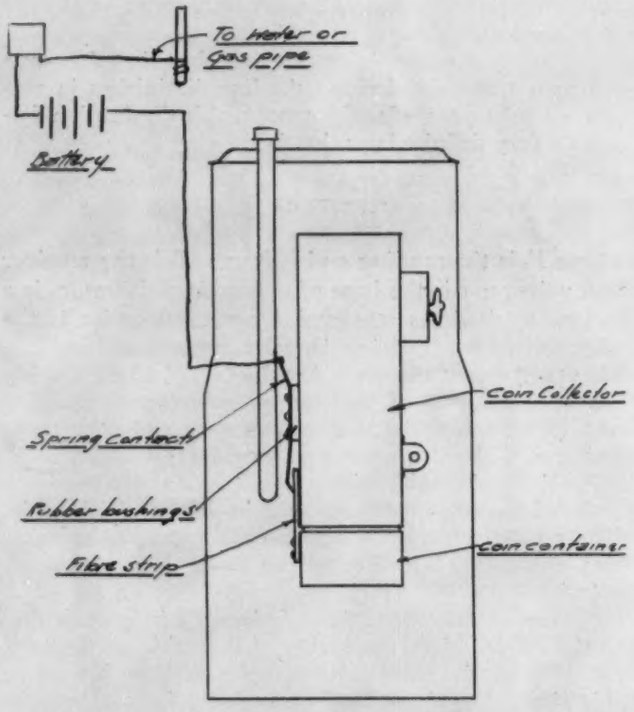
Not long ago, in our district, some parties applied for gas to be used in filling a balloon which they intended running as a captive. We advised them to secure a location near one of our high pressure mains, which they did, and we made a special tap for them. After the first filling of the balloon with gas, it was found that the balloon lost a certain amount of gas each trip and that it was necessary to replenish the gas a little every day if many trips were made. The balloon was a spherical one having a capacity of 56,000 cu. ft. and was allowed to ascend about a thousand feet in the air and return by means of a hoisting engine and snatch block attached to an anchor.

The parties worked up quite a business, and as we had been sending a man each time, they needed gas, to turn on the valve, one of our foremen finally installed a regulator and meter with satisfactory results. It consists of a 2-inch Chaplin Fulton regulator and a 100 ft. round meter. The gas pressure on the inlet side of the regulator was 20 pounds and the pressure on the outlet side varied between 7 inches and 16 inches water column, depending on the amount of gas being taken. The maximum amount of gas passed through the meter per hour at any time was found to be 3,600 cu. ft. This is beyond the rated capacity of the meter, but the meter was tested afterwards at this same rate and found to be correct.

### CATCHNG THE PREPAYMENT METER THIEF MADE EASY.

That electric energy is used for many and divers purposes other than for power, lighting, the telegraph and telephone, goes without saying. Even the gas man sometimes calls upon this hidden agency to help him, but 'tis a bright mind that conceived the idea of using the "juice" to catch a burglar, and a still brighter thought to use this same subtle power to trap the festive prepayment meter thief. Here is the way one of our members puts it:

For some time we were troubled by thieves robbing a few of our prepayment meters, and doing it in such a way that we had reason to suspect an employe. We had the suspected man watched, and even baited a meter with marked coin, but failed to catch him at his nefarious work. It was at this time that we conceived the idea of calling upon the unseen electric power to aid us in solving our difficult problem. We had the alarm, as shown by the blue prints, attached to a prepayment meter which was alluringly located, and securing a convenient room were prepared to receive our unwelcome visitor should he see fit to seek an involuntary contribution from us. This meter had been robbed twice before, each time a day or so previous to the date for reading the meters. We now felt prepared, and anxiously awaited results. My confidant when coming home on the theatre train, noticed our suspect on the same train, and as soon as possible telephoned me to be on the lookout. At 3:00 o'clock in the morning, the burglar alarm was sounded. I went to the front door, and firing a shot in the air commanded the burglar to halt, but he took a chance at escape and fled over the back fence. A police officer, my friend and myself made a search of the town, but failed to find our man. We reasoned that he would want to get back to San Francisco where his home was. So we took the early morning train, and at one of the stopping places our man also got




**Burglar Alarm.**

on. I talked with him, and, pleading that I was out of money, asked for a small loan. The man gave me a couple of quarters, one of which bore the mark that had been placed on the decoy coin in the meter. It was necessary to use a revolver to take the man from the train. The officer was notified, and drove up to get the prisoner who was placed in jail. He was later taken to the county jail to await a preliminary hearing.

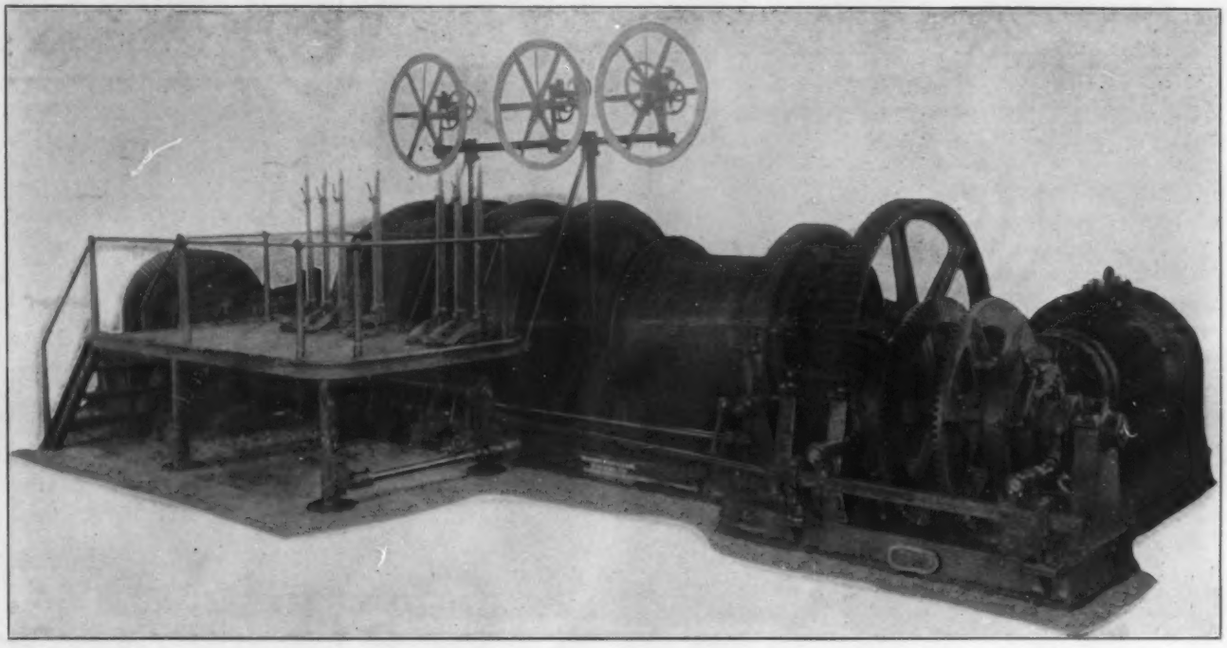
For two years the man had been in the employ of the gas company, and was thoroughly trusted up to the time when the robberies began. The amount secured by him since he began operations was from $50 to $75. Unfortunately for him he changed several of the marked coins for larger pieces at a saloon and was thus easily identified.

## MODERN APPLICATIONS OF ELECTRIC MOTORS TO MINE HOISTING.[1]

BY LEON M. HALL.

Electricity is to the Western miner what the automobile has been to his brother, the prospector, an almost indispensable adjunct in the exploration and development of the "Great American Desert." The applications of electric energy to the mining industry are so numerous and so varied that I shall not at this time attempt to go into detail but will take up briefly one of the most difficult problems with which engineers have had to deal—namely, the application of the electric motor to mine hoisting.

In the consideration of electrical hoisting engines, it might be appropriate to start with a brief discussion of the reasons and conditions which have facilitated the introduction of the electric drive into this immense and ever expanding field of electric application.



Three Phase Induction Electric Hoist at Mercur, Utah

Hoisting, with its objectionable peak at the time of starting and acceleration, has always been a disturbing element in a transmission or distributing system, especially where the hoists are large in proportion to the power plant capacity or where they are located at the end of a long distance transmission line. Many methods have been devised to overcome this peak feature, that is in order to secure a constant load factor, and with just what success I shall endeavor to set forth in the following:

About ten years ago, electricity was introduced on the Comstock and it was my good fortune to be entrusted with the task of applying it practically to the various mine operations such as pumping, air compressing and hoisting. The first two worked out admirably, the last mentioned being the one problem that really offered serious obstacles.

The Comstock power contract with the electric company at this time was a very severe one because it called for a $7.00 rate based upon a peak load of two minutes' duration. Furthermore, the initial generating plant, for all purposes, consisted of only two 750 k. w. generators, water wheel driven at the end of a 35-mile transmission line, so that the introduction of electric motors of sufficient capacity to drive the then existing steam hoists was clearly out of the question; in fact, it became a serious question as to the practicability of using electricity at all for such a purpose.

Up to this time, the variable speed induction motor was still in the process of development and it really looked as though we would be compelled to resort to a continuously running induction motor equipped so that it could be connected to the reels by means of friction clutches (such a hoist was then in operation at Mercur, in Utah), to use a d. c. generating set or to resort to the generation of compressed air and use it in the existing steam engines. The last mentioned was tried out but the compressed air plants were entirely inadequate for the operation of the ponderous geared and first-motion hoists in use; in fact, there existed air capacity enough for only the actual mining operations. It meant, then, the installation of enormous compressors or an entire departure from any existing methods.

About this time, the mines along the Mother Lode of California were experimenting on lines laid down by Mr. C. O. Poole and they finally succeeded in securing some excellent results by the use of compressed air reheated in the old boiler plants. Many of these installations are still in operation and this method has been carried on successfully in both Tonopah and Goldfield, notably in the Goldfield Consolidated where they are working under a peak load of one minute's duration.

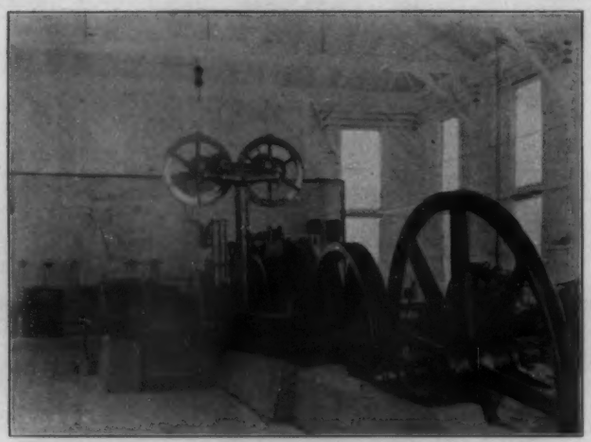
This method of applying electricity indirectly to hoisting operations has its advantages, particularly to the producer, inasmuch as the peak is eliminated and

[1] Paper read before American Mining Congress, Goldfield, Nev., Sept., 1909.

the load factor nearly a constant one, and for properties operating under peak load conditions it has the attractive feature of keeping the power bill within range of economical operation.

On the Comstock it was finally decided to install electric hoists equipped with the then new variable speed induction motor. For installations under 50 h. p. the motor was geared directly to the hoisting drums but for operations requiring a greater capacity, I adopted a system similar to the Whiting System and known as the balanced tail rope hoist. This, within the limits of its application and capacity, has proven an unqualified success.

To meet the conditions imposed in the contract by the electric company, and at the same time to maintain a high efficiency, it was evident that the motors should operate continuously at or near their full load capacity and, in the matter of control, be designed especially for the work to be performed. For a continuous full load condition, the work must, of necessity, be constant, or nearly so, at all points in the lift, and the nearest possible approach to this was secured by the adoption of the balanced system, where the load is reduced to the weight of the rock alone. Then, to secure the necessary variations in speed, an induction motor with a non-inductive resistance in both primary and secondary was developed by the General Electric Company; the secondary resistance, and consequently the speed of hoisting, being varied by the introduction of a modified form of the ordinary street car controller.



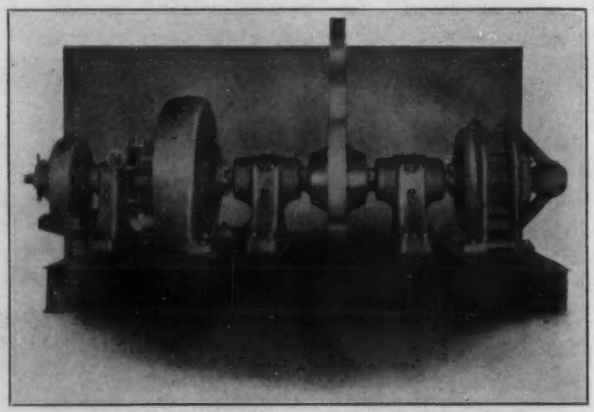
Balanced Hoist at Union Shaft, Virginia City, Nevada

With an equipment of this kind the cages are started slowly and the dip in line voltage is comparatively slight, being about 7 per cent at starting and the time of acceleration eight seconds. By running on the second notch of the controller, one-third of the maximum speed may be maintained for the full length of the shaft without over-heating or other serious results.

The hoist itself consists of a main driving drum and an idler around which the rope is wrapped four times, in order to secure the necessary friction for lifting. From the main driving drum, the rope is carried over the head sheaves, each end being attached to the top of a cage. The tail rope is fastened to the bottom of each cage and passes down one compartment, under a movable tail sheave, and back the second compartment to the bottom of the second cage. These hoists have been in continuous successful operation for about eight years, and while they are not adaptable for all conditions of mine hoisting, particularly where many different levels are to be accommodated, they have shown remarkable results in the economy of operation and the cost of power.

For instance, the hoist at the Yellow Jacket, lifting from the 1200 foot level has, with a 75 h. p. motor, raised 200 tons of ore in less than nine hours. The hoist at the Union Shaft, geared to a 100 h. p. General Electric variable speed induction motor, is hoisting from the 2000 foot level at the rate of 1250 feet a minute and, during five years' service, has not cost one cent for repairs. The load being balanced except for the actual rock lifted, the starting torque is low and the surge on the line almost negligible.

To my mind, this system can be varied to suit almost any condition, but, in order to secure the best recults, it rests with the engineer to thoroughly study the individual hoisting engine proposition and to adopt whatever is best suited to meet these conditions.



Flv Wheel Motor Generator Set, Kendall Gold Mining Co.

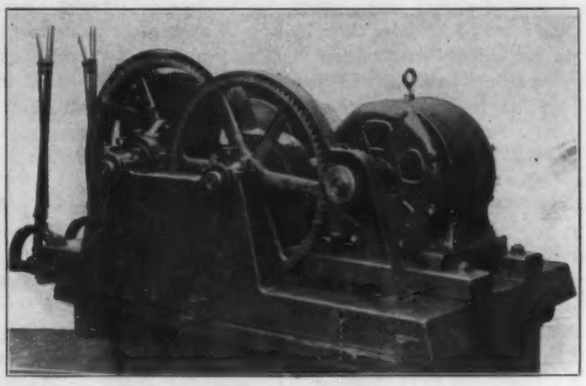
Where alternating current is the source of supply, as is almost invariably the case, the most successful and practical method of application to hoisting conditions is through the motor generator fly wheel set. This method is by no means new but is practically so as applied to mine hoisting on this continent and, for this reason, the method has not received the consideration that is really due.

For its own protection, in preventing disturbances on its system, a power producing company must natuarally establish a limit beyond which an ordinary induction hoist motor will not be permitted on its circuits. For the heavier hoisting conditions, which are getting heavier with time as the shafts become deeper and the hoisting speed consequently increased, the motor-generator fly wheel system adapts itself admirably. While the first cost of such a plant is comparatively high on account of the number of machines employed, economy and perfect control are compensating features, the former more particularly where the operation is semi-continuous.

A hoisting equipment of this character is made up of a shunt wound direct current motor so arranged that it may be geared to any form of hoisting drums or reels, this motor to receive its power from a motor-generator set driven from the main power system. Such a set is clearly shown in the accompanying cut

and consists of an induction motor and direct current generator, with a fly-wheel swung between them, and a direct current exciter unit overhung at one end of the set. The function of this latter machine is to excite the field of the generator and that of the direct current hoist motor. The speed and direction of rotation of the hoist motor is controlled by varying the field strength of the direct current generator by means of a rheostatic controller, which is conveniently located for the hoist operator.

The induction motor is a variable speed machine, while the direct current generator is provided with commutating poles and operates with a weak field at all loads. The fly-wheel is a machined steel casting and is perfectly balanced—so much so, that these sets have been known to spin for over an hour after the line current is cut off. The wheel is used to store energy when the hoist is not in operation and is called upon to give up this stored energy when the demand on the line is at a maximum. To obtain this effect, the induction motor is arranged for variable speed work, changes in speed being automatically controlled by the variation of the main line current, which is led through a small three phase regulating motor operating a water rheostat in series with the secondary winding of the motor.



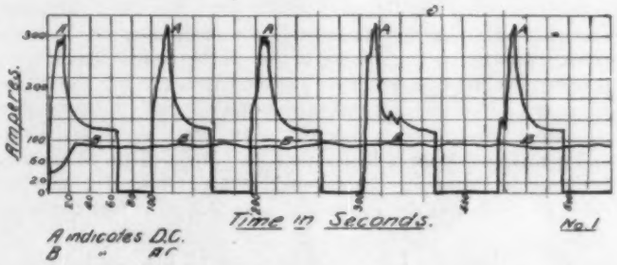
Cripple Creek Type of Electric Hoist

The torque which is produced by the full load value of the main line current in the windings of the regulating motor is exactly balanced by the weight of the moving parts of the water rheostat, so that there is no change in the resistance that is in series with the rotor winding of the motor generator set so long as the motor is taking full load current. If, however, it should demand more or less, there is an immediate movement of the water rheostat, tending to accelerate or retard the speed of the motor generator set to such a point that the induction once more takes full load and the movement of the water rheostat is stopped.

The voltage of the exciter is maintained at a constant value during the speed variation of the motor generator set by means of a Tirrill regulator.

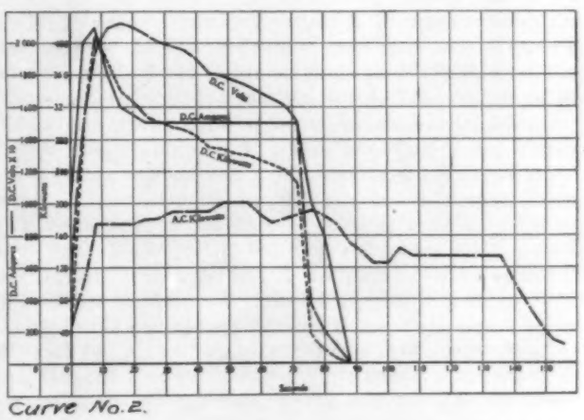
By reference to curve diagram No. 1 taken from the hoist built for the Kendall Gold Mining Company, it will be observed that the input to the induction motor is practically constant and that the undesirable starting peak has entirely disappeared. The direct current side shows the characteristic hoisting curve where the peak has been overcome by the stored energy of the fly-wheel.

The Westinghouse company has developed a system which is very similar to the one described. A notable example of the same being the hoisting sets built for the El Oro Mining and Railroad Company of Mexico. These sets are located 171 miles from the source of power. The largest of these is of 400 h. p. capacity and has been in operation for one and one-half years. This generating set is fitted with a 40,000 pound fly-wheel nine feet in diameter mounted between the two machines; the no load speed of this set being 480 r. p. m. This set is used to operate a 400 h. p. direct current motor that is geared to one of their old steam hoists. The drums are 8 feet in diameter and the speed of hoisting 900 feet a minute.




The total load raised is 11,445 pounds and curve diagram No. 2 shows plainly the relation between the alternating and direct current while hoisting a bucketful of ore from the lowest level. This set consumes 25 k. w. when running empty and, when the current is cut off, the energy of the fly wheel will raise full load 595 feet. The cost of hoisting with this outfit amounts to only seven cents, Mexican money, per 1000 foot tons.

In Europe immense strides have been made in the application of electricity to mine hoisting; in fact, induction motors of 3000 h. p. capacity are in use and a rope speed of over 3000 feet per minute is attained. In many cases, the control and operation of their hoists is almost automatic, so much so, in fact, that the German Government will allow a speed of 1980 feet per minute when hoisting men by electricity, while with the old reliable steam hoist the speed is limited to 1188 feet.




Curve No. 2.

The engineers of this country have awakened to the fact of the flexibility of the electric motor for hoisting purposes and, while it is now in common use, I am firm in the belief that in the next decade its use will be almost universal.

## PROCEEDINGS OF THE SEVENTEENTH ANNUAL CONVENTION OF THE PACIFIC COAST GAS ASSOCIATION, HELD AT 445 SUTTER STREET, SAN FRANCISCO, CAL.

### Discussion on "Oil Gas Residual and How to Handle It"

(Concluded)

*Mr. Lowe:* There is no question about that, but I think it will be many years before the little fellow with a very small output will do anything. It will not pay him to get rid of lampblack, except he may save it and sell it to somebody else who can convert it into other forms.

*Mr. Valentine:* He is too far from the market.

*Mr. Lowe:* There is one thing not generally understood. As a builder of gas works I have had the question put to me many times, "Why is it that large plants have so much more lampblack than they require, while little plants don't have enough?" It is the old question of the inefficiency of the small plant. Another point: when a gas works builder builds gas-making apparatus, he puts in a boiler of sufficient size to run the apparatus. Now the gas-maker subsequently adds a pump, then possibly a compressor or anything that comes along, and keeps piling their work on a boiler that was intended to do nothing but provide steam for the gas-making apparatus. He gets the extra steam, but at the expense of very inefficient fuel consumption.

*Mr. Valentine:* I think the tendency all the way through is to put in too small apparatus in the first place.

*Mr. Lowe:* There is no doubt about that, but the contents of the man's purse is unfortunately too small. When a gas works is originally built it is usually a very small one, and one of the most inefficient units in the world is a small steam boiler. Again, very few know how to fire lampblack scientifically. I am not speaking individually, but generally of the men who fire the boilers. Any of you might do it all right, but we don't pay our firemen $250 a month. We pay them about $65, and try to reduce that figure, if we can; get it down to $2 a day if it is possible, and therein is your trouble. I am now right up against this proposition myself. In the works at Tonopah, we put in a little 25-horsepower boiler, because it was then large enough, but we need a seventy-five now. How much better it would have been had we put in a large one in the first place. I made the mistake myself, and you all make it, and what is more, you will all keep right on making it, because you feel you have not got money enough in the first place, and you can't subsequently take out the small one, because your owners won't let you.

*Mr. Jones:* I don't think Mr. Lowe is fair in blaming himself in that way. I don't think any man on earth could have anticipated the growth of the gas business in central California. The size of the units have more than doubled. Nobody could have anticipated the immense growth of the business. There is one matter I would like to mention, and that is the mixture of fuels, which has been employed in some works, and which it seems to me is fatal to efficiency. I have always contended that a man should not mix fuels of any two kinds or more than two kinds. That is, I find it is not even an advantage to mix coal and coke, or different kinds of coal, but when it comes to the burning of oil, spread in over a bed of lampblack, practically the oil acts as a fire extinguisher. Let us take, for instance, the conditions existing in a boiler furnace. We have set bars on which we put lampblack, which is carbon. That carbon to be burned, to produce heat, combines with the oxygen of the air, and the product of combustion is carbonic acid gas, which we all know is a non-combustible gas, and is a good fire extinguisher. The other gas going along with the carbonic acid gas is nitrogen, which is also inert, and which is the natural result of combustion, being separated from its oxygen in the air. Now, then, if we have performed certain results with lampblack burning with air passing through it, we have above that bed of lampblack an atmosphere of carbonic acid gas and nitrogen; now why should we inject into these non-combustible gases an oil in vapor or liquid form and expect it to burn? I would recommend instead of trying to do that, that a man use lampblack under the boiler as long as it lasts, and when his lampblack is gone, he should make use of the oil exclusively, and pile up the lampblack in some corner and let it dry until he gets a sufficient quantity to fire his boiler for a week or a month, or a longer time, according to his judgment.

*F. C. Jones:* Do you use lampblack under one boiler and oil under another, or do you change from lampblack to oil?

*The Chairman:* I could not answer that question directly. We have a large battery of boilers, something like ten or twelve. I think what is used principally under our boilers is the product from the scrubbers.

*E. C. Jones:* Your conditions in the South are somewhat different from those in the North, inasmuch as you have developed a market for lampblack, and so you receive enough for this lampblack briquettes to warrant you in using oil under your boilers. We can't do that in Northern California, because there has been no market developed here amounting to more than $2.75 per ton for ordinary dried lampblack. We have never attempted to sell briquetted lampblack, and oil is worth much more than that per ton.

*Mr. Hill:* What is the experience of the gentlemen here in regard to the use of the lampblack; that is, as to just how well it dries? Does wet lampblack burn best, or the dry, for use under the boiler to make steam?

*Mr. Jones:* I will answer that question if you will permit me. At one time we had a large surplus of lampblack at our Oakland station piled up, which became a nuisance, and after considerable prayer and begging the electric department offered to use some of it under their boilers. I took great pains to give them the driest lampblack we had, and one day I found a man playing a hose on a pile of lampblack, and I said: "What are you doing that for?" He replied: "It burns much better when it is wet." And I stopped drying it. I found that lampblack containing 30 per cent of water is an excellent fuel to burn under the boiler.

*Mr. Hill:* That has been my experience at my plant. We had an accumulation of about 300 tons of lampblack down at Monterey, and it had been accumulating for a year and a half or two years, and they had made no effort to burn it. We fitted one of the boilers in the gas plant so that the lampblack could be burned, and in the course of time the pile disappeared, and we finally got down to wet lampblack, and I said to the foreman: "What will we do?" "We will have to shut down and let that dry." I said: "Haul it right in, it burns better wet than it does dry." With a good deal of persuasion and a lot of coersion, I managed to keep the men at it, and it is a question even yet with one or two of the men but what the dry burns better than the wet, and I wonder whether any of the other gentlemen have had a like experience. But as a matter of fact, we find in the Salinas plant, where they have been burning it wet, they take it right out of the separator, and we discovered that the water that has brought the lampblack to the separator seems to probably carry a little napthalene and the other residuals with it, and that even the lampblack burns better taken right out of the separator than dry lampblack, and we are doing that now.

*Mr. Rix:* I think a good deal of expense and labor could be saved in the firing of boilers with lampblack by the use of marine firemen. I find by observation in the different plants that the firemen who are employed are what we call the stationary type of firemen, and in firing lampblack that they don't give it the care and attention they should, while when the marine fireman is out on the ocean and their coal is bad, and everything, he can't throw down his shovel and say: "Well, we will let it go." He has got to fire. It is the same way with marine firemen who are put to firing lampblack. They study it, and in that way I think you obtain better results.

*The Chairman:* I don't believe the value of this carbon or lampblack is appreciated. I don't believe there is hardly any of the companies who have fully worked the thing up to its most valuable commercial stage. I am told that the coal company to

whom we sell the carbon briquettes in Los Angeles is getting $9 a ton delivered, a very good price, which is about equal to the price of coal, or very little less, and in time they will get just as much as they get for a ton of fairly good coal. On that basis you couldn't afford to use carbon under the boilers.

*Mr. Valentine:* In addition to the paper, I desire to state I have recently completed another shaped platform by which when they scrape the lampblack off the platform it flows in front of the boiler, so that there is no shoveling excepting from in front of the boiler to the furnace, and in regard to the making of briquettes, it seems to me a platform properly elevated could be connected by means of ducts so as to carry the lampblack immediately to the briquetting machine without manual labor.

*Mr. Lowe:* I want to make a little prediction on the ultimate use of lampblack. I don't know how long it will take to come about, but you will all be one day converting it into coke, and not into briquettes, and the coke will be a very excellent product, about 99.9 per cent pure carbon, and which you will be selling for the manufacture of electrodes and other articles requiring a very pure form of carbon. It takes time to reach these flights and many minds have been working on the ultimate use of this lampblack. Our industries, unfortunately, develop by evolution and not revolution; otherwise none of you would be using lampblack today other than for the manufacture of the best kind and purest form of carbon next to the diamond. You don't yet realize its possibilities, but in time you will know more of it.

*Mr. Kuster:* Another question that occurred to me was the arrangement of the scrubbers. It appears to me the natural way for a man to do who had as much trouble with the first and second scrubbers as he probably has would be to just reverse the arrangement and have the first and second scrubbers the baffle plates, and the trays in the third and fourth. I would like his reason for that.

*Mr. Valentine:* My reason for providing for the trays in the first scrubber is to break up the gas into as small particles as possible, so as to separate every particle of the gas, whereas if you use baffle plates as the first scrubber, I am strongly of the opinion the tar would be liable to clog along the edges of these plates and force the water to go down in a solid stream at one side or the other and allow the gas to by-pass. My object in using the baffle plates beyond the purifiers would be that there would be no solid matter there that when the gas passes through the water as it flows from plate to plate it turns the water into a vapor; as I expressed it there, I think I used the word very nicely, I rinse the gas. We wring every particle of foreign matter out of it.

*Mr. Vance:* I would like to ask Mr. Jones a question, or some one in the room, as to how many pounds of dry carbon do you get to each thousand cubic feet of gas?

*Mr. Jones:* We have reduced the amount now to twenty pounds per thousand cubic feet. In the beginning of oil gas manufacture we made as much as thirty pounds and over, but by changes in the process we have reduced that to about twenty pounds per thousand.

*The Chairman:* How many gallons of oil per thousand?

*Mr. Jones:* Calculating nine gallons to the thousand.

*The Chairman:* Does that include the tar?

*Mr. Jones:* That includes everything. We don't separate the tar. We have twenty pounds of residual. There is very little tar. The tar flows with the waste water and lampblack from the scrubbers and from the wash box into the separators. It adds to the fuel value of the lampblack and acts as a binder for the briquettes.

*Mr. Lowe:* Is there any member present who has trouble in cleaning his scrubbers? Do they stick up with tar and give you trouble at all?

*Mr. Hargreaves:* I probably can answer that. In San Jose we have two plate scrubbers that take the crude gas first, and they are very efficient. We have not had much trouble with them; and I think myself that really the first part of the gas should go through baffle plate, and then through the tray scrubbers, if it is necessary to scrub further.

*Mr. Lowe:* What do you mean by baffle plates?

*Mr. Hargreaves:* The trays and so on all the way down.

*Mr. Lowe:* The alternating system?

*Mr. Hargreaves:* Yes, sir.

*Mr. Lowe:* Not the waving baffle plates?

*Mr. Hargreaves:* No.

*Mr. Hill:* We are having all kinds of trouble.

*Mr. Lowe:* Then turn the blow-off of your boiler into the top of your scrubber and you will get rid of it. I wouldn't have allowed any of our gas-makers to do it at one time, but I now find that it is a very efficient way. We don't pay any more attention to clogged scrubbers, other than to turn the blowoff of the boiler into the scrubbers, and there seems to be no more trouble.

*Mr. Lowe:* If you run your apparatus with heat sufficiently low to keep entirely down the naphthalene trouble, I would not like to pay your oil bills. You can overcome your naphthalene trouble more or less with low heats, but it requires a high degree of heat if you are going to make oil gas economically. Our crude oil is far too valuable to remain as low in cost as at present; it is going to climb, while the gas selling price cannot climb, as city authorities are not going to allow it, at least, to any great extent. You must, therefore, find some other substance for making gas, and it will probably be one that is unknown in gas manufacture today. I refer to the form of so-called oil which is almost too thick and heavy to be pumped. Its gravity cannot be measured in liquid form, but that is the material you will sooner or later be converting into gas, and to do so will require a higher degree of heat than now, hence more trouble to overcome in the way of naphthalene.

*Mr. Jones:* A word about scrubbers. There is an excellent reason why baffle plate scrubbers give no trouble; because they do little work. If a man would save the money of putting in baffle plate scrubbers and extend his take-off pipe he would get about as much efficiency out of it. Back in 1879, when I thought I knew a great deal about the gas business, I discovered a picture of a still for the manufacture of sulphuric acid in a book on science, and I got up a beautiful gas scrubber, consisting of inclined trays with perfectly straight edges for the imaginary flow of a waterfall over the edge, perfectly true from side to side. The gas inlet was at the bottom. The gas passed up through these various waterfalls and was supposed to be thoroughly cleansed, but it did not work. The water would go down one side of that infernal thing, and the gas would go up the other. But I didn't have any trouble from it. Now the man that has trouble with a well-built scrubber needs something for his liver. He wants to be stirred up. I have been in San Francisco eighteen years and have used one type of scrubber, consisting of wooden trays made of carefully surfaced pine lumber, nailed together with spacing pieces so they form grids placed at right angles to each other in alternate layers. The trays are made smaller than the diameter of the shell to facilitate putting them in place and removing them. The space between the steel shell and the wooden trays is carefully caulked with excelsior in order to prevent the by-passing of gas. The gas must go up through the trays, and the water passes through them. There is no better or cheaper form of scrubber, and if it stops up, it is due to negligence or ignorance In eighteen years in San Francisco I have never seen a wooden tray taken out of a scrubber with either oil gas, coal gas or water gas, but I have known of its being done in other places. Therefore, if we have a good scrubber, which is the cheapest kind of scrubber, why don't we take care of it rather than adopt some other plan of scrubber of which we know nothing. If we take the trouble to look back to Clegg and Accum and Murdock, and look at the pictures in the books back in 1818 and 1819, and observe the forms of apparatus used in England at that time, we will find that some of us are trying to readopt the earlier forms of gas-making apparatus.

# APPROVED ELECTRICAL DEVICES

**CONDUIT BOXES.**

Cast iron hatchway junction box for use in connecting the control circuits in electrically controlled elevator installations. Junction boxes provided with slate terminal board. For use with control circuits only. Approved Oct. 1, 1909. Manufactured by

**Otis Elevator Co., 9 Jackson Blvd., Chicago, Ill.**

**CONDUIT BOXES, FLOOR OUTLET.**

"Mesco" floor box with receptacle. Cat. No. 16430, 10 A., 250 V. Approved Sept. 28, 1909. Manufactured by

**Manhattan Electrical Supply Co., 17 Park Place, New York, N. Y.**

**CONDUIT OUTLET BUSHINGS.**

Cast iron split tees and elbows for use in connection with conduit installations of control circuits only of electrically controlled elevators. Approved Oct. 2, 1909. Manufactured by

**Otis Elevator Co., 9 Jackson Blvd., Chicago, Ill.**

**FIXTURES.**

"Linolite" fixtures with special straight filament incandescent lamps in series or in multiple on circuits not over 250 volts. Approved for show case, show window, cove and cornice, theater and general illuminating purposes, when installed under conditions satisfactory to Inspection Departments having jurisdiction. Approved Oct. 2, 1909. Manufactured by

**Johns-Manville Co., H. W., 25 Fulton St., Brooklyn, N. Y.**

**MISCELLANEOUS.**

"Adjustable Hickey." For use in aligning fixture stems. Approved Oct. 5, 1909. Manufactured by

**Macallen Company, Foundry and Division Sts., Boston, Mass.**

**RECEPTACLES, STANDARD.**

"Bryant" 3 A., 250 V. Sign, Cat. Nos. 1700, 40488, 46749, 59108. Cleat, Cat. Nos. 9402, 9403, 921, 1011, 1123, 50715, 11221, 28795, 58949 (formerly 23209), 58300, and 48301 (formerly 23210). Concealed, Cat. Nos. 50744; also 9447, fusible, 2 A., 125 V. Moulding, Cat. Nos. 42453, 58302 and 58950 (formerly 34152). Conduit Box, Cat. Nos. 9514, 9397, 40507, 40537, 59107, 62357, 62355 and 62356. Rosette Receptacles, cleat and concealed types, fusible, 2 A., 125 V., Cat. Nos. 9434, 9436, 9438, 9404, 9405 and 9406. Approved Sept. 30, 1909. Manufactured by

**Bryant Electric Co., Bridgeport, Conn.**

**RECEPTACLES, STANDARD.**

"Marshall" 3 A., 250 V. Cleat type, Cat. No. 44954. Sign Receptacle, Cat. Nos. 68028 and 68027. Approved Oct. 2. 1909. Manufactured by

**Marshall Electric Co., Hyde Park, Mass.**

**ROSETTES, LINK FUSE.**

"G. E. Co." 2 A., 125 V.; cleat type, Cat. Nos. 39234, 60123; concealed type, Cat. Nos. 39236, 60124; conduit box type, Cat. No. 65963. Approved Oct. 1, 1909. Manufactured by

**General Electric Co., Schenectady, N. Y.**

**ROSETTES, FUSELESS.**

"G. E." Fuseless Rosettes, 3 A., 250 V. Cleat type, Cat. Nos. 39235, 43111 and 59809. Concealed type, Cat. Nos. 39237 and 59807. Moulding type, Cat. Nos. 39239 and 59808. Conduit Box type, Cat. No. 65962. Approved Sept. 30, 1909. Manufactured by

**General Electric Co., Schenectady, N. Y.**

**TRANSFORMERS.**

"Kuhlman" Transformer, 250-350, 500, 750 and 1000 watts. Primary voltages 110 or 220 A. C.; Secondary voltage 10-12. A core-type auto-transformer, contained in a moisture proof sheet metal case, for use with low voltage incandescent lamps. Approved when the wiring of both primary and secondary circuits is in accordance with the rules, Class C, Wiring, of the National Electrical Code, and when properly mounted on a slate or marble panel. Approved Sept. 28, 1909. Manufactured by

**Kuhlman Electric Co., Elkhart, Ind.**

**WIRES, RUBBER COVERED.**

"Crescent" brand, red, white or black cores. "Imperial" brand, white core. Tag on coil to read, "Nat'l Elec. Code Standard." Marking: Red and Green threads crossing in braid. Approved Oct. 1, 1909. Manufactured by

**Crescent Insulated Wire & Cable Co., Trenton, N. J.**

**CABINETS.**

"G. E." Lever Switches, in iron boxes, Cat. Nos. 45008-45017 incl. "G. E." Quick Break Switches, in iron boxes, Cat. Nos. 33664 and 33665. "G. E." Enclosed Cartridge Fuse Cutouts, in iron boxes. Cat. Nos. 48709-48714 incl., 58716-58719 incl., 250 V. Cat. Nos. 48715-48720 incl., 600 V. Approved Sept. 20, 1909. Manufactured by

**General Electric Co., Schenectady, N. Y.**

**CABINETS.**

"Lyon" Sheet Steel Cabinet. For panelboards, service entrance switches and cutouts. Approved Sept. 20, 1909. Manufactured by

**Lyon Metallic Manufacturing Co., Aurora, Ill.**

**MISCELLANEOUS.**

Electrically Illuminated Cash Register. On each side of the cash register is placed an arm to which it attached a miniature socket and lamp. A switch is mounted inside the case which is operated by the cash drawer, closing when the drawer opens, and vice versa. Approved Sept. 15, 1909. Manufactured by.

**American Cash Register Co., Columbus, Ohio.**

**RECEPTACLES, FOR ATTACHMENT PLUGS.**

Stage pocket and plug; 50 A., 250 V., for one and two circuits. An iron floor box in which is mounted a slate base carrying receptacles for special attachment plug for stage cable. Portable plugging box and plug 30 A., 125 V., for theater stages. Sheet metal box in which are mounted receptacles for special attachment plugs for stage cable and cutouts for 30 A., 125 V. plug fuses. Two, three or four circuits. Approved Sept. 21. 1909. Manufactured by

**Chase-Shawmut Co., Newburyport, Mass.**

**RECEPTACLES, FOR ATTACHMENT PLUGS.**

"Mesco," 6 A., 125 V., 3 A., 250 V. Flush, Cat. Nos. 16413, 16421-23 incl. Cleat, Cat. No. 16425. Moulding, Cat. No. 16426. Concealed, Cat. No. 16427. Conduit Box, Cat. No. 16430, 10 A., 250 V. Approved Sept. 21, 1909. Manufactured by

**Manhattan Electrical Supply Co., 17 Park Place, New York, N. Y.**

**RECEPTACLES, STANDARD.**

"Bryant" key and pull (50 C. P., 250 V.) and keyless (3 A., 250 V.) Brass Shell Wall Sockets. Key, Cat. Nos. 9184, 60018, "New Wrinkle" 66609, with slotted or closed bases, and Angle Base 50753; Keyless, Cat. Nos. 9185, 50717, 60019, 60020, "New Wrinkle" 66610, with slotted or closed bases, and Angle Base 50755; Pull "New Wrinkle," Cat. No. 66611. Wall Sockets mounted on K. W. link fuse rosette base, 2 A., 125 V.; Cleat types, key and keyless, Cat. Nos. 50729 and 50732 respectively. Concealed types, key and keyless, Cat. Nos. 50730 and 50733 respectively. Also all the above types with shadeholders attached. Approved Sept. 20, 1909. Manufactured by

**Bryant Electric Company, Bridgeport, Conn.**

**RECEPTACLES, STANDARD.**

Porcelain shell, keyless, 3 A., 250 V.; Cleat Type, Cat. Nos. 11221, 28794, 28795, 50715, 59275 and 61039; Concealed Type, Nos. 49355, 50717, 50744; also 50752, fused, 2 A., 125 V.; Moulding Types, Nos. 34152 and 42453; Conduit Box,

Nos. 9514. 9397, 40537, 49354, 60931 and 62357; Sign Receptacle, No. 46627. Wall Sockets, brass shell, key, 50 C. P., keyless, 3 A., 250 V.; Concealed Base, Nos. 9184, 9185, 27742, 27743, 29404, 29405, 60018, 60019, and 60020; Angle Base, Nos. 28721, 50753 with slotted or closed bases, and Nos. 28722, 29406, 29407 and 50755. Approved Sept. 21, 1909. Manufactured by

**General Electric Co., Schenectady, N. Y.**

**RHEOSTATS.**

"Di-el-ite' Resistance Units. These units are made in cylindrical forms and consist of resistance wire embedded in a non-combustible cement known as "Di-el-ite." They are also made in cylindrical and rectangular forms with a protecting casing of metal. Various styles of terminals are furnished. Approved when suitably mounted on bases of non-combustible material. Approved Sept. 21, 1909. Manufactured by

**Di-el-ite Mfg. Co., 4901 Stanton Ave., Philadelphia, Pa.**

**RHEOSTATS.**

G. E., all capacities, 125-500 V. Motor starters, CR-107 and CR-109 (Type SA). Motor starters with field control, CR-162 (Type SFA). Speed regulating, continuous duty, CR-151-154 incl. (Type RA). Printing press control, CR-171 and 171-A (Type PB). Field rheostats, CR-174 (Type F). Field rheostats, sprocket driven, CR-178 (Type F). Field rheostats, electrically operated, CR-179 (Type F); also CR-111, CR-163 and 155 to 158 incl. (Types SO, RO and SFO respectively), with overload release devices which are inoperative during process of starting motor. Approved only when other circuit breakers or fuses are installed in connection with them. See N. E. Code Rule 60-g. Approved Sept. 15, 1909. Manufactured by

**General Electric Company, Schenectady, N. Y.**

**ROSETTES, FUSELESS.**

G. E. Cushioned Rosette, Cat. No. 66678, 3 A., 250 V. A device intended for use with Tungsten lamps and designed with an elastic medium of felt between the lamp cord and the interior surface of cap. Approved Sept. 20, 1909. Manufactured by

**General Electric Company, Schenectady, N. Y.**

**SOCKETS, STANDARD.**

"Benjamin" Socket Extension, Cat. No. 91. Approved Sept. 20, 1909. Manufactured by

**Benjamin Electric Mfg. Co., 43 W. Jackson Blvd., Chicago, Ill.**

**SOCKETS, STANDARD.**

"Perkins" Brass Shell Sockets. Key 50 C. P., 250 V. Cat. Nos. 9386P, 50760P. "New Wrinkle" 59480P, 59481P and 59484P. Pendant "New Wrinkle" 59486P; also all the above with insulated metal key. Keyless, 3 A., 250 V. Cat. Nos. 9392P, 50768P. "New Wrinkle" 59482P, 59483P and 59485P. Pendant "New Wrinkle" 59487P. Also above types with shadeholders attached. Approved Sept. 14, 1909. Manufactured by

**Perkins Tlectric Switch Mfg. Co., Bridgeport, Conn.**

**SOCKETS, STANDARD.**

"Union," 50 C. P., 250 V. Brass shell key sockets of two types, one having terminal plates on the side of the porcelain base and the other having terminal plates on the top of the porcelain base. Approved Sept. 20, 1909. Manufactured by

**Union Electric Co., Hamilton Ave., Trenton, N. J.**

**SWITCHES, PENDANT SNAP.**

"C. H." 6 A., 125 V., 3 A., 250 V. Pendant; all porcelain, Cat. No. 7000; brass cap 7003, and two circuit 7020. Also Cat. No. 7010, 10 A., 125 V., 5 A., 250 V. For fixture use; brass cap Cat. Nos. 7001 and 7002. Approved Sept. 14, 1909. Manufactured by

**Cutler-Hammer Mfg. Co., Milwaukee, Wis.**

**SWITCH BOXES.**

"Fancleve" cast iron switch boxes. For metal conduit, Cat. Nos. 351, 501. For flexible tubing, Cat. No. 651. For wooden moulding, Cat. No. 201 (Universal switch or junction box) and Cat. No. 402 (supporting box for surface snap switches). For armored cable, Cat. Nos. 721-2-3-4. Approved Sept. 15, 1909. Manufactured by

**Fancleve Specialty Company, Jamaica Plain, Mass.**

**TRANSFORMERS**

"Kuhlman" Transformer, 250-350, 500, 750 and 1000 volts. Primary voltages 110 or 220 A. C.; Secondary voltage 10-12. A core-type auto-transformer, contained in a moisture proof sheet metal case, for use with low voltage incandescent lamps. Approved when the wiring of both primary and secondary circuits is in accordance with the rules, Class C, wiring, of the National Electrical Code, and when properly mounted on a slate or marble panel. Approved Sept. 15, 1909. Manufactured by

**Kuhlman Electric Company, Elkhart, Ind.**

**WIRES, SLOW-BURNING WEATHERPROOF.**

Slow-burning insulation on the outside. Tag on coil to read, "Nat'l Elec. Code Standard." Approved Sept. 20, 1909. Manufactured by

**General Electric Co., Schenectady, N. Y.**

**ATTACHMENT PLUGS, FUSELESS.**

"Bryant" 3 A., 250 V. Porcelain brass cap, Cat. No. 1948. Moulded Composition (Weatherproof), Cat. No. 345. Approved Sept. 20, 1909. Manufactured by

**Bryant Electric Co., Bridgeport, Conn.**

**ATTACHMENT PLUGS, FUSELESS.**

Brass Cap Attachment Plug, Cat. No. 110, 3 A., 250 V. Approved Sept. 23, 1909. Manufactured by

**Freeman Electric Co., E. H., Trenton, N. J.**

**CONDUIT BOXES.**

Universal pressed steel boxes, types 300-S, 320-S, 99-S, 9-S, 7-S, 77-S, 44-S, 4-S and 5-S, with covers for all types. Also "Dead Ground" cast boxes for use with armored cable. Approved September 21, 1909. Manufactured by

**Thomas & Betts Co., 299 Broadway, New York, N. Y.**

**RECEPTACLES, STANDARD.**

"Bryant" 3 A., 250 V. Sign, Cat. Nos. 1700, 40488, 46749, 59108. Cleat, Cat. Nos. 9402, 9403, 921, 1011, 1123, 50715, 11221, 28695, 58949 (formerly 23209), 58300 and 58301 (formerly 23210); Concealed, Cat. Nos. 50744; also 9447, fusible, 2 A., 125 V. Molding, Cat. Nos. 42453, 58302 and 58950 (formerly 34152). Conduit Box, Cat. Nos. 9514, 9397, 40507, 40537, 59107, 62357, 62355 and 62356. Rosette Receptacles, cleat and concealed types, fusible, 2 A., 125 V., Cat. Nos. 9434, 9436, 9438, 9404, 9405 and 9406. Approved Sept. 7, 1909. Manufactured by

**Bryant Electric Co., Bridgeport, Conn.**

**SOCKETS, STANDARD.**

"Dimalite" Turn Down Socket. A lamp holder with screw plug attachment having a resistance suitably enclosed by means of which regulation of incandescent lamp is secured. Approved only for use with 16 C. P. lamps at 125 volts or less. Approved Sept. 21, 1909. Manufactured by

**Di-el-ite Mfg. Co., 4901 Stanton Ave., Philadelphia, Pa.**

**SOCKETS, STANDARD.**

Brass Shell Sockets. Key, 50 C. P. 250 V. Cat. Nos. 9386, "Security Snap" 44147, 44148, 44151, 44814, also 50760. Also 60504, 60506, 60510, 60514, 60516 with mica discs under Edison screw shell. Keyless, 3 A., 250 V., Cat. Nos. 9392, "Security Snap," 44149, 44150, 44152, 44815, also 50768. Also 60505, 60507, 60511, 60515, 60517 with mica discs under Edison screw shell. Pull, 50 C. P., 250 V., Cat. Nos. 68018-68020 incl. Approved Sept. 21, 1909. Manufactured by

**Marshall Electric Mfg. Co., Hyde Park, Mass.**

**SWITCHES, AUTOMATIC.**

Automatic Time Switch, 5, 10, 20 and 30 A., 250 V. This device consists of an approved double pole snap switch connected directly in a clock mechanism. A sheet metal case is provided which encloses the clock and switch mechanism. Approved Sept. 20, 1909. Manufactured by

**Reliance Automatic Lighting Co., Warren, Ohio.**

JOURNAL OF ELECTRICITY
POWER AND GAS
PUBLISHED WEEKLY BY THE
Technical Publishing Company
E. B. STRONG, President
A. H. HALLORAN, Secretary and Managing Editor
DIRECTORS
R. J. DAVIS A. M. HUNT E. M. SCRIBNER C. L. COEY E. B. STRONG
604 MISSION STREET, SAN FRANCISCO

TELEPHONE - - - - - - - - - KEARNY 918

TERMS OF SUBSCRIPTION

| | | |
|---|---|---|
| United States, Cuba and Mexico | per year. | $2.50 |
| Dominion of Canada | " | 3.50 |
| Other Foreign Countries within the Postal Union | " | 5.00 |
| Single Copies, Current Month | each | .10 |
| Single Copies, prior to Current Month | " | .25 |

NOTICE TO ADVERTISERS

Changes of advertising copy should reach this office *ten days in advance of date of issue.* New advertisements will be accepted up to noon of Monday dated Saturday of the same week. Where proof is to be returned for approval, Eastern advertisers should mail copy at least thirty days in advance of date of issue.

FOUNDED 1887 AS THE
PACIFIC LUMBERMAN, CONTRACTOR AND ELECTRICIAN

## CONTENTS

Tokyo Hydroelectric Plant ..... 375

German Automatic Telephone Exchange ..... 376

Permanent Characteristics of Long Distance Telephone Lines 376
*By A. B. Domonski and B. M. Woods.*

Report Experience Department Pacific Coast Gas Association 378
*By R. P. Valentine.*

Modern Application of Electric Motors to Mine Hoisting.. 379
*By Leon M. Hall.*

Proceedings Pacific Coast Gas Association ..... 382

Approved Electrical Devices ..... 384

Editorial ..... 386
Business Easements.

Personals ..... 387

Portland Section, A. I. E. E. ..... 387

Journal Portraits ..... 387
Wynn Meredith.

News of Stationary Engineers ..... 388
San Francisco No. 1.
Experiences.

Civil Service Examination ..... 388

Trade Catalogues ..... 388

San Francisco Lamp Club ..... 389

Trade Notes ..... 389

Books Received ..... 390
"Alternating Current Motors."
"Electric Power Conductors."
"Questions and Answers About Electrical Apparatus."
"Automobile Troubles and How to Remedy Them."

Patents ..... 391

Industrial ..... 392
500 h. p. Westinghouse Electric Hoist.
Meeting of Studebaker Managers.
Sewing Machine Motors.
Kimble Motors.

News Notes ..... 395

**Business Easements**

By easement we refer to a curve used in engineering design to avoid any sudden change in the direction or acceleration of moving masses. It is the process that gives gradual guidance to minimize the shock resulting from change in mass motion. Such is the transition curve in a railway track, which lessens the force of impact in passing from a tangent to a turn. The dash-pot of a steam engine is likewise intended to eliminate vibration in the machine parts. Hydraulic pipe lines are constructed with easement curves to connect straight runs to circular arcs. The guiding vanes in pumps and turbines are but easement curves. Recent experiments have proved that even the flexibility of electric transmission would theoretically require the absence of sharp turns, as otherwise there is an appreciable loss of power in sudden bends.

The theory of easements seems to be but a part of the great laws of Nature that recognize the inefficiency, if not the impossibility, of a cataclysm. We see this law exemplified in the long continued detrital accumulation that builds the sand bars, and in the accumulative accretion that develops animal and plant life. Even the cataclysm is due to slow and gradual, but incessant, changes that ultimately seek violent vent, unless easement is provided.

A great invention, that appears to come with the suddenness and the brilliancy of an unpredicted comet, has been a long time materializing in the minds, not only of the inventors, but of many others before, who have provided the forgotten curves of easement.

In business, as in mechanics and Nature, there are certain easements that make smooth its course. The home and school training of a lad are but the easement curves that prepare him for the buffetings of business. The polish possessed by one from whom the crudities and rough edges of individual personality have been worn is an easement curve of success. Tact in the telephone man, or diplomacy in the central station manager are the easements that smoothly guide a business through industrial turmoil. A business conducted in obedience to these principles, like a ship of good "lines," will make better progress and avoid the shocks which come from abrupt changes.

---

This week the eyes and thought of the world have been upon San Francisco rebuilt. A brief thirty months have sufficed to convert a feeling of pity to one of congratulation. While the festivities in the city have clustered around the historic figure of Portola, their effect has been to make this city a "Port-a-Light." The predominating feature of the celebration has been a brilliant electric illumination which readily lends itself to the spectacular. Some of these will be illustrated in our next issue.

## PERSONALS.

H. G. Aylesworth left last Tuesday for Los Angeles.

S. Wyman Rolph of San Francisco was married on October 16.

John S. Eastwood, civil and hydraulic engineer, was in San Francisco this week from Fresno.

K. G. Dunn, of Hunt, Mirk & Co. is expected from the Northwest at the end of this week.

V. A. Wellcott is now the engineer with the Butte, Mont., office of the General Electric Company.

P. R. Shipley is now with the Sacramento district office of the Pacific Gas and Electric Company.

R. D. Holabird made a short trip to Los Angeles this week, returning to San Francisco Friday morning.

C. E. Berry of the railway department of the General Electric Company, returned to Schenectady this week.

Robert A. Bowden of the General Electric Company's San Francisco sales department, is to be married, on the 27th of October.

W. A. Stock, formerly associated as engineer with Thomas Morrin, is now engineer for the Pacific Amusement Company of Oakland, Cal.

Julius C. Calisch, general manager of the Buffalo and Lake Erie Traction Company, has returned to Buffalo after a trip to the Pacific Coast.

Theodore Beram, manager of the New York office of the General Electric Company, and S. A. Traurck of the same office, were in San Francisco this week.

G. R. Folds, general sales manager of H. W. Johns-Manville Company, who is visiting all the branch offices, leaves San Francisco for Seattle this week.

Lester R. Wiley of Bangor, Me., a hydro-electric engineer owning power interests in the Upper Stanislaus River near Big Oak Flat, was a visitor in San Francisco last week.

L. H. Bean, manager of the Whatcom County Railway, Light & Power Company at Bellingham, Washington, is in the East with regard to increasing the power capacity of his plant.

R. M. Cole, representing the Bryan-Marsh Co., Chicago, manufacturers of incandescent lamps, is on the Pacific Coast with the intention of establishing a district office. He is now in San Francisco.

C. F. Elwell, who has acquired the American rights for the Poulsen system of wireless telegraphy and telephony, has returned to San Francisco from Europe and has opened offices in the Foxcroft Building.

Walter Cary, general manager Westinghouse Lamp Co., New York City, has been in San Francisco for the past week. He is continuing his trip and expects to be at his Eastern office in about two weeks.

D. W. Beldon was recently appointed manager of the El Paso, Texas, office of the Westinghouse Electric and Manufacturing Company. Mr. Beldon was formerly with the Tucson, Ariz., office of this company.

Fred L. Baer is now superintendent of equipment for the Home Telephone Company of San Francisco, having been transferred from a similar position with the Home Telephone Company of Alameda County, Oakland, Cal.

## PORTLAND SECTION A. I. E. E.

The last regular meeting of the Portland Section of the American Institute of Electrical Engineers was held in the Knights of Pythias Hall at Eleventh and Alder streets, October 19th, 1909, at 8 p. m. L. Quimby of the Allis-Chalmers Company abstracted B. R. Shover's paper on "The Industrial Application of the Electric Motor as Illustrated in the Gary Plant of the Indiana Steel Company."

# JOURNAL PORTRAITS

Wynn Meredith was born in Illinois in 1865 and received his engineering education in the University of Illinois. He was early identified with electric light and railway properties in the Middle West and in 1892-3 became assistant superintendent of operation of the World's Fair Columbian Exposition in Chicago, having direct charge of the operation of the World's Fair plant throughout the period of the exposition. He came to California in 1894 and became assistant engineer in the electrical department of the Midwinter Fair held that year. In the latter part of the same year he became associated with the firm of Hasson & Hunt as assistant engineer. During this connection he was engaged in the reorganization and electrification of the street railways in Los Angeles and was also field engineer in charge of the construction work of the Nevada County Electric Power Company. In 1898, associated with Mr. A. M. Hunt, he commenced a general engineering business, continued until 1908. During this

**Wynn Meredith.**

period Mr. Meredith was in charge of the design and construction work of several prominent western developments, including the Colgate plant of the Pacific Gas & Electric Company, the Truckee River General Electric Company's plant on the Truckee River, Cal., the Shingleton plant at Electra, Shasta County, Cal., of the Northern California Power Company, the Coldstream plant of the British Columbia Electric Railway Company and the Vancouver Power Company's installation at Vancouver. B. C. During the latter portion of this period, Professor C. L. Cory and Mr. Wyatt H. Allen were also members of the firm.

In 1905 Mr. Meredith was selected as one of the western board of supervising engineers in connection with the Stanislaus Electric Power Company's development in California. This connection led, in 1908, to his becoming a member of the firm of Sanderson & Porter of New York, engineers and contractors, as the Western representative of this firm. Mr. Meredith is a member of the American Institute of Electrical Engineers, also of the American Society of Civil Engineers.

## NEWS OF THE STATIONARY ENGINEERS.

**PREAMBLE.**—This Association shall at no time be used for the furtherance of strikes, or for the purpose of interfering in any way between its members and their employers in regard to wages; recognizing the identity of interests between employer and employe, and not countenancing any project or enterprise that will interfere with perfect harmony between them.

Neither shall it be used for political or religious purposes. Its meetings shall be devoted to the business of the Association, and at all times preference shall be given to the education of engineers, and to securing the enactment of engineers' license laws in order to prevent the destruction of life and property in the generation and transmission of steam as a motive power.

**California.**

No. 1. San Francisco. Thursday, Central Hall, 124 Fulton St. Pres., A. C. Arbuckle. Sec., Herman Noethig, 900 York St.

No. 2. Los Angeles. Friday, Eagles' Hall, 116½ E. Third St. Pres., J. F. Connell. Fin. Sec., Harry Notthoff, 1307 Winfield St. Cor. Sec., W. T. W. Curl, 4103 Dalton Ave.

No. 3. San Francisco. Wednesday, Merchants' Exchange Bldg. Sec., David Thomas, 914 O'Farrell St.

No. 5. Santa Barbara. Geo. W. Stevens, 2417 Fletcher Ave., R. R. No. 2.

No. 6. San Jose. Wednesday. Pres., W. A. Wilson, Sec., Lea Davis, 350 N. 9th St.

No. 7. Fresno. Pres., A. G. Rose. Sec., E. F. Fitzgerald, Box 651.

No. 8. Stockton. Thursday, Masonic Hall. Sec., S. Bunch, 626 E. Channel St. Pres., H. Eberhard.

**Oregon.**

No. 1. Portland. Wednesday, J. D. Asher, Portland Hotel. Pres., B. W. Slocum.

No. 2. Salem. A. L. Brown, Box 166.

**Washington.**

No. 2. Tacoma. Friday, 913½ Tacoma Ave. Pres., Geo. E. Bowman. Sec., Thos. L. Keeley, 3727 Ferdinand St., N., Whitworth Sta.

No. 4. Spokane. Tuesday. Pres., Frank Teed. Sec., J. Thos. Greeley, 0601½ Cincinnati St.

No. 6. Seattle. Saturday, 1420 2d Ave. Pres., H. R. Leigh. Sec., J. C. Miller, 1600 Yesler Way.

**Practical letters from engineers and news items of general interest are always welcome. Write your items regardless of style. Communications should be addressed to the Steam Engineering Editor.**

### SAN FRANCISCO NO. 1.

S. F. No. 1, N. A. S. E., has in the past two months initiated as active members many engineers who hold important positions in the United States Army Transport Service and at large, who no doubt will add to the interest of the educational features of this association. Some of them are: John Donnelly, R. A. McCabe, John P. Cruden, John J. Hughes, and John N. Paulson, all of the U. S. A. T. S., and F. B. Dunn of State Dredger No. 3 and Thomas D. Thomson of the Pacific Mail Steamship Co.; also Arthur L. Jordon, vice-principal of the Polytechnic High School, who was elected and initiated an honorary member. Much interest is manifest on the probability of having the city engineer lecture on the water supply for San Francisco from the Hetch Hetchy district. The educational committee of which John W. Maher is chairman are redoubling their efforts, so as to have that lecture come off soon, also to have one lecture on every meeting night during the winter months.

President P. L. Ennor is also lending his assistance in making the meetings interesting and the initiation of candidates as impressive as possible, and also to explain all points in question very clearly to the members present and to assist the individual members in the various problems which they bring before the association.

The license committee, of which L. H. Honigbaum is chairman, will probably make a report on the State license proposition on next meeting night, which certainly is very interesting, as the National Association of Stationary Engineers throughout the United States have similar committees at work, some of whom have already succeeded in having a State license law passed.

### EXPERIENCES.

Most engineers, no doubt some time or other have met with experiences which seem strange. A certain engine was shut down as usual at night in apparent good condition. When it came time to start in the morning the engine made about one-half revolution and stopped suddenly near the end of the back stroke. An effort to turn the engine over the back center by hand proved unavailing. Upon examination it was found that the piston rod had broken off just where it went through the piston, allowing the nut to drop to the bottom of the cylinder in the clearance space as the clearance was about 5-32 inch in, and the nut 1⅛ inches thick it was obvious that the engine could not run. Also that the rod had broken after the engine was stopped, as otherwise serious damage would probably have been the result.

On another occasion a certain steamer arrived in port after a 2000 mile ocean voyage. As usual the cylinders, pistons, etc., were examined. In raising the follower ring with the chain tackle it was noticed that the piston came up with the ring notwithstanding that all the follower bolts were removed. Upon examination it was found that the piston rod was broken off just at the crosshead and that the rod and piston were temporarily stuck to the follower ring by the fit of the same. In this case it is also safe to assume the piston rod broke after the engine was actually stopped as otherwise the piston would undoubtedly have gone through the head. The resultant damage had better be left to the imagination.

The foregoing accidents are doubtless due to what may be termed metal fatigue.

C. C. ELSASSER.

### CIVIL SERVICE EXAMINATION.

The United States Civil Service Commission announces an examination on November 22-23-24, 1909, to fill a vacancy in the position of skilled draftsman (experienced in instrument work) at the Frankford Arsenal, Philadelphia, Pa., at $1400 per annum, and vacancies as they may occur in the position of skilled mechanical draftsman in the ordnance establishments, at an entrance salary of $900 to $1200 per annum.

The United States Civil Service Commission announces an examination on November 24, 1909, to fill vacancies as they may occur in the position of drainage engineer, Department of Agriculture, at salaries ranging from $1200 to $1500 per annum. The examination will consist of practical questions in the drainage of irrigated lands, (to be submitted with application), and education and experience (rated on application). The thesis, which may be either typewritten or in the handwriting of the applicant, must contain not less than 1000 words and must be illustrated by diagrams drawn in pencil. Either one of the two following named subjects may be selected as the subject of the thesis: (1) How to drain irrigated lands—my personal experience. (2) Relation of drainage lands—my personal observations.

### NEW CATALOGUES.

Anderson switches and switchboard appliances are attractively listed and portrayed in Bulletin No. 23 from Albert and J. M. Anderson Mfg. Co., Boston, Mass.

Water treatment is the subject of a handsome catalogue from the Dearborn Drug & Chemical Works of Chicago. It is devoted largely to show the company's facilities and operations.

The Patterson Wireless Battery System is illustrated and described in a booklet from Stanley & Patterson, Inc., New York City. Being intended largely for distribution among motor boat owners it contains much information of value to them.

## THE SAN FRANCISCO LAMP CLUB.

In the course of a tour throughout the Pacific Coast several members of the National Electric Lamp Association were in San Francisco last week, as mentioned in these columns. While in the city, they were entertained at luncheon at the Techau Tavern by the San Francisco Lamp Club. The accompanying flashlight photograph shows those present. Included in the number were:

M. A. Bryte, Sterling Lamp Co.; R. J. Davis, California Inc. Lamp Co.; Fred H. Poss, Holophane Co.; E. M. Coates, Colonial Electric Co.; Mr. Winslow, Economy Electric Lamp Co.; F. H. Woodward, Standard Electric Works; F. J. Quinn, Crescent Electric Co.; F. J. Cramm, Electric Appliance Co.; R. M. Cole, Bryan Marsh Co.; H. V. Carter, Pacific Electric Co.; T. E. Bibbins, General Electric Co.; C. C. Hillis, Packard Lamp Co.; R. D. Holabird, Holabird Reynolds Electric Co.; H. R. Noack, Pierson, Roeding & Co.; H. F. Froesch, Cal. Inc. Lamp Co., S. Gregory, Fostoria Lamp Co.; G. I. McColgan, Rex Lamp Co.; Walter Cary, Westinghouse Lamp Co.; J. A. Vandergrift, Oakland Warehouse Co.; A. D. Page, General Electric Co.; Vanderlyn Stowe, Peerless Lamp Co.; B. G. Tremain, National Lamp Ass'n.; F. C. Terry, National Lamp Ass'n.; Mr. Hill, Franklin Electric Mfg. Co.; W. S. Berry, Sunbeam Lamp Co.; Mr. Pierce, Shelby Lamp Co.; H. B. Squires, Columbia Lamp Co.; W. L. Goodwin, Pacific States Electric Co.; W. W. Briggs, Westinghouse Electric Co.; F. B. Gleason, Western Electric Co.; G. A. Knoche, Buckeye Electric Co.; Mr. Meyerberg, Star Lamp Co.; Jos. Theigen, Jos. Theigen Co.

This meeting was one of several devoted to a discussion of the trade conditions on the Coast and a description of the methods of the National Association. The local conditions were reported to the visitors as being in a fairly prosperous way. At the close of the meeting there was an election of officers of the San Francisco Lamp Company; Vanderlyn Stowe being made chairman and W. S. Berry, secretary. The club meets once a month at the Techau Tavern.

## TRADE NOTES.

The Allis-Chalmers Company has received an order from the Holton Power Company of Imperial Valley for a 700 k. w. water wheel type generator.

The General Electric Company has received an order from the U. S. Mint authorities for two 100 k. w. and one 150 k. w. 250 volt d. c. turbine generator sets, to be installed in the San Francisco Mint.

*Dana Photo* — **Luncheon given by San Francisco Lamp Club to Visiting Members National Electric Lamp Association**

The Geo. W. Lord Company of Philadelphia, Pennsylvania, have established a Western office at 412-414 Market street, San Francisco, under the management of H. L. Gaskill and R. Ingram.

The Southern Pacific Company has ordered from the General Electric Company one 125 k. w., 250 volt d. c., 2400 r. p. m. non-condensing turbine for use as an exciter at their new steam station in Fruitvale.

The Allis-Chalmers Co. will be in their new San Francisco offices at 160 Second street, the Byron Jackson building, on the 2d of November. These give them about four times the office space that they have at present.

The Holabird Electric Company has purchased the supply department of the Kilbourne, Clarke Co. of Seattle and will continue the business at the old location, 307 First avenue, South. E. J. Dwyer, formerly of San Francisco will be the sales manager. Kilbourne & Clarke will continue the machinery department and the operation of their machine shop.

Max D. Baron, an electrical and illuminating engineer of San Francisco, installed the tungsten lighting system in Newman & Levinson's new building at the corner of Stockton and O Farrell streets, San Francisco. The building consists of five stories, basement and mezzanine floor and is completely lighted, outside and inside, with tungsten incandescents. On the inside, 40, 60 and 100-watt lamps are used while the outside is lighted with about one thousand lamps of four candle power.

Recent shipments of the Pacific Electric Manufacturing Company of San Francisco include 18 pole top switches to Santa Cruz for Coast Counties Light & Power Company, and 10 to Portland Railway Light & Power Company; also four electrically controlled 80,000 volt oil switches, 6 automatic release oil switches, and 6 pole top switches to Seattle, Tacoma Power Company; 10 electrically controlled 50,000 volt switches to Utah Railway, Light & Power Company, and four steel tower-top 100,000 volt switches for Great Western Power Company's equipment of the Cowell Portland Cement Works.

Mr. F. E. Whorff, chief electrician for the San Francisco Harbor Commission, has an interesting record on the lighting of the Ferry Building. About the first of the year, Buckeye tungsten incandescents were substituted for the carbon filament and arc lamps in use in the waiting rooms and nave of the building. According to Electrician Whorff, the lighting was improved 100 per cent and according to the records that have been kept the consumption of electricity has been cut about 40 per cent. Ten clusters of six 100 watt lamps each, were installed in the nave and the records show that these lamps have given a continuous service of over 2750 hours, to date. There has been no appreciable loss of candle power. Four lamps were carefully examined recently and showed no evidence of deterioration and when tested with a watt-meter, showed less than the rated consumption in each case. The readings were: 91, 92½, 92½ and 97½ watts, respectively, for the four lamps. Renewals since the first of the year have been two in number; one was broken in cleaning and the other was, supposedly, a defective lamp.

## PELTON-FRANCIS TURBINE AT LA GRANGE.

The Pelton Water Wheel Company were recently awarded a contract by the La Grange Water and Power Company for a 850 h. p. Pelton-Francis turbine to operate under 212-foot head and at 450 r. p. m. This turbine will be direct connected to a 450 k. w. Westinghouse alternator and the equipment form an addition to their existing hydro-electric plant supplying current to the La Grange dredge, City of Modesto, and the Turlock Irrigation District.

A special feature in connection with the installation of particular interest is the Pelton mechanically operated relief valve operating in synchronism with a Pelton oil pressure governor. Owing to the exceptionally difficult governing conditions existing in this plant incident to the dredging load, the water wheel equipment possesses several features of interest for affording the closest attainable speed regulation. It is expected this plant will be in operation within the next three or four months, at which time the La Grange Water and Power Company, it is reported, will raise the voltage on its transmission line to some 30,000 volts on account of wide radius of transmission incident to the new load being constantly picked up.

## BOOKS RECEIVED.

**"Alternating Current Motors."** By A. S. McAllister; 322 pages; 5¾x9 in.; 138 diagrams. McGraw Hill Book Company, New York City, and The Technical Book Shop, San Francisco. Price, $3.00.

Students of electrical engineering will extend a warm welcome to a third edition of Mr. McAllister's well known work on alternating current motors, as it gives consideration to the latest additions to this class of machinery. It embraces a complete treatment of the theory and design of induction, synchronous and commutator motors, especially of the recently developed "split pole" variable ratio synchronous converters which is but a part of considerable new and valuable material on synchronous converters considered both as motors and as condensers. The matter of presenting this subject is such as to convey to the student's mind maximum knowledge with minimum effort. It may be well likened to the knowledge of geography gained from a descending balloon, the general features being seen first, and the details left until the last, all so correlated that the relation each to the other is readily comprehended. The text is not an elementary one, and can be fully appreciated only by a reader thoroughly familiar with the fundamental facts of electricity and magnetism. The third edition will be found ever more useful than the preceding ones.

**"Electric Power Conductors."** By Wm. A. Del Mar; 339 pages; 5x7 ins.; 69 diagrams; D. Van Nostrand Company, New York City, and The Technical Book Shop, San Francisco, Cal. Price, $2.00.

So much has been written upon the subject of electric wires and cables that a new treatise must possess exceptional merit to be accorded recognition. The merit possessed by this text over most others is the logical manner in which the author considers the purchase of conductors, first as to material, then as to insulation and size, and finally as to installation, including specifications and tests. It has a rare combination of brevity and completeness, and is provided with a good index for ready reference. The book deals with all classes of wiring calculations and estimations for both direct and alternating current distribution, including underground and overhead power transmission. It contains much original matter of a practical nature and great care and judgment have evidently been exercised in the selection of previously published data. Among the most valuable of these latter are the sections on alternating current feeder calculations and stresses in spans by Dr. Harold Pender. The book is marred by a number of typographical errors that suggest careless proof-reading, but in no way detracts from its practical utility to the engineer.

**"Questions and Answers About Electrical Apparatus."** By W. B. Clayton & James W. Craig; pocket size; leather bound. James W. Craig, West Lynn, Mass., and The Technical Book Shop, San Francisco. Price, $1.00.

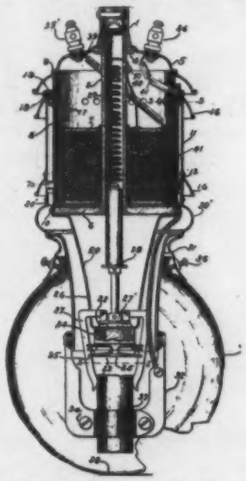
This book, unlike the usual catechism, contains questions that any and all of us are likely to ask, problems that a practical man is continually meeting in using any of the various forms of modern electrical apparatus. The answers, likewise, are concise and to the point. It includes the remedies for troubles with d. c. and a. c. motors, transformers, mercury rectifiers, meters, turbines, and all other machinery about a power plant. It is essentially a collection of perplexities that were met and solved by two young men, the authors, while working in the shops of the General Electric Company. It is well worth the price asked.

**"Automobile Troubles and How to Remedy Them."** By Charles P. Root; 219 pages; 5½x7½ ins.; leather bound. Charles C. Thompson, Chicago, and The Technical Book Shop, San Francisco. Price, $1.50.

This book is one of practical instruction upon the repair of automobile gas engines. The method delineated consists in first finding the cause of the trouble, and then suggesting how it may be removed. This is facilitated by two tabulations of ordinary roadside troubles, which permit a preliminary diagnosis before time is wasted upon unnecessary trials. Each cause is subsequently treated in detail, according to an alphabetical arrangement. An exhaustive index, which might still further aid the amateur in his troubles, has unfortunately been omitted, and should be provided in the future editions, for the book is worthy of such. The volume also includes excellent instructions upon the overhauling and general repair of a car. It is an indispensable edition to the tool kit.

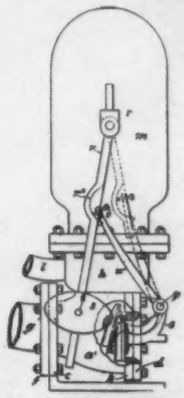
# PATENTS

**935,896. Arc Lamp.** John T. H. Dempster, Schenectady, N. Y., assignor to General Electric Company. In an arc lamp, the combination of a pair of stationary main electrodes one of which is a conductor of the first class and the other composed of a material which is liable to become a conductor of the second class under the action of the arc, but is



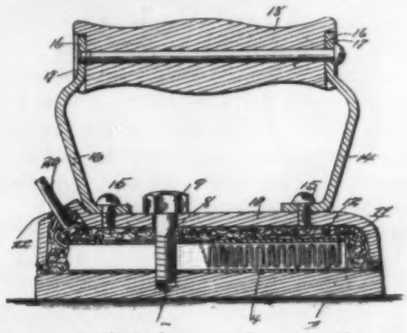
incased in a conductor of the first class, with a movable auxiliary electrode in permanent electrical connection with the first named stationary electrode, and means for moving it from engagement with the inclosure of the second stationary electrode a distance greater than the distance between the two stationary electrodes.

**936,244. Hydraulic Ram.** Frederick Hesse, Portland, Oregon, assignor to Columbia Steel Company, Portland, Oregon. In a hydraulic ram, the combination of a body made with a vertical enlargement at the waste outlet, the latter being located in the lower part of said enlargement, a waste valve constituting a closure for said waste outlet, a dome like air chamber located in the roof of said enlargement and directly above said waster orifice, the waster orifice being arranged to provide direct communication from



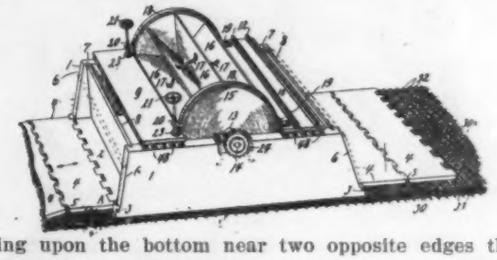
the exterior to said air chamber during the periodic opening of the waste valve, a delivery valve in the roof of said air-chamber, an air dome over said delivery valve, said air-chamber serving to store part of the air admitted during each periodic opening of the waste valve, suspending means for the waste valve adapted to partially lift the latter, when opened, into said air chamber, so as to entirely clear the lower part of said waste orifice and shield the upper part of the latter against the outflowing waste stream, and means adapted to periodically open said waste valve.

**935,816. Electric Heater.** William A. Rankin and Willard M. Harwood, Hutchinson, Kans., assignors to Harwood Electric Heating Company, Hutchinson, Kans. In a device of the character described, a body formed upon one



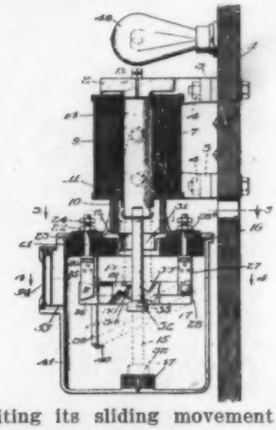
side with an acting face and upon the opposite side with an integral raised portion with a series of slots formed therein, and a resistance element or elements in said slots and composed of a high resistance material of ziz-zag form.

**935,749. Dam for Producing Power and Regulating the Depth of Water in Streams.** Frank Fredeen, Taylors Falls, Minn. In a structure for any of the purposes set forth, a sinkable pier or supports formed of a bottom and two walls



standing upon the bottom near two opposite edges thereof and adapted to stand edgewise to the current of the water, and aprons detachably hinged to each end of the bottom.

**935,733. Solenoid-Switch.** Arthur W. Berresford, Milwaukee, Wis., assignor to The Cutler-Hammer Mfg. Co., Milwaukee, Wis. In a solenoid switch, the combination with a winding, of a knife switch arranged below said winding, a plunger co-operating with said winding, said plunger being slidably connected with said knife switch and having means

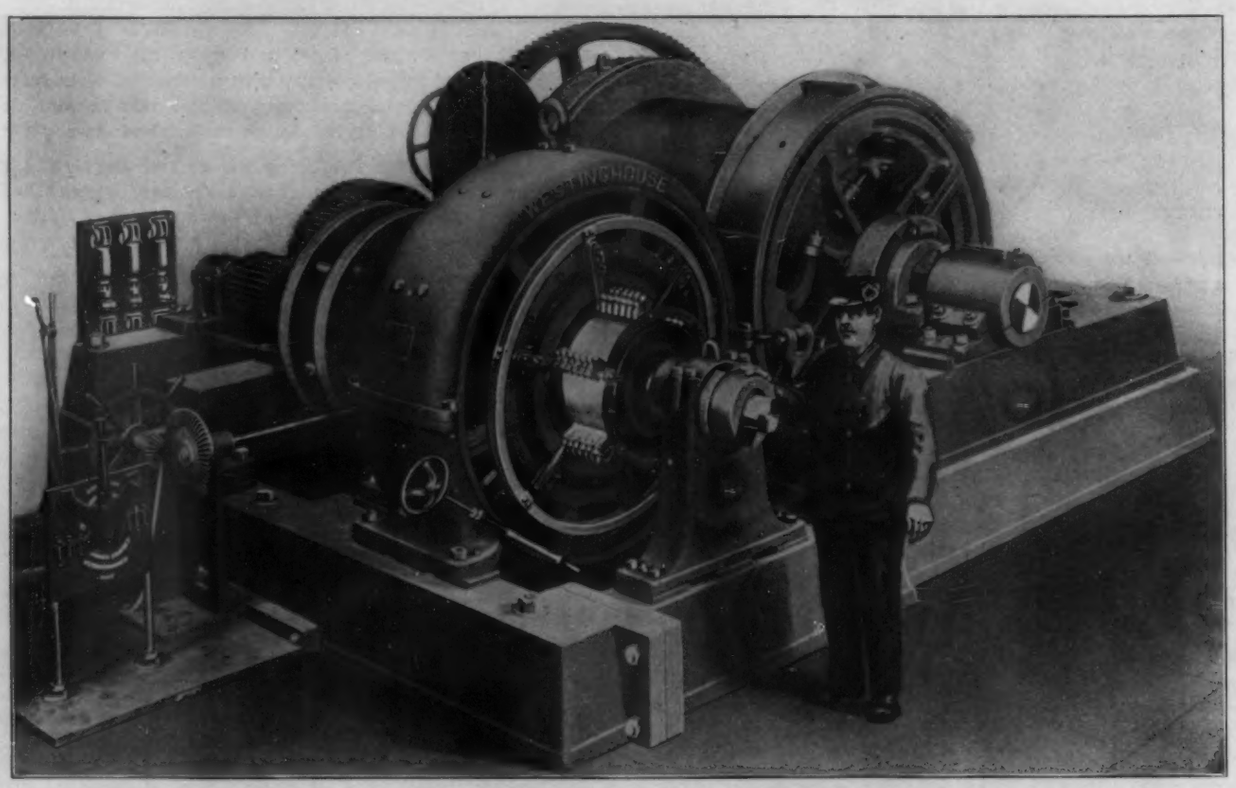


thereon for limiting its sliding movement relative to said knife switch whereby a hammer blow is delivered in the face of said blades at which said face is presented to the grinding face of said wheel, and means for sliding said cutter holder and carrying a blade of the cutter across the face of the ring of said grinding wheel.

# INDUSTRIAL

## LARGE ELECTRIC MINING HOIST WITH 500 HORSE-POWER MOTOR.

There was recently installed in the mine of the Washington Coal & Coke Company at Dawson, Pa., a large mine hoist with an electric motor which presents several features of considerable interest. The hoist is used to haul thirty-five mine cars, averaging 3800 pounds each when loaded, up a maximum grade of 8½ per cent, 8000 feet long at a speed of 600 feet per minute. The loaded cars start at the bottom of the slope on a 4 per cent grade, which gradually increases until the maximum grade of 8½ per cent is reached near the top, where the loaded cars are pulled in on a landing on a grade of about 6 per cent and on a curve of 150 feet radius.



500 h. p. Westinghouse Electric Mine Hoist.

The empty cars will be allowed to drift down the slope by gravity, controlled by a brake on the hoist drum.

The hoisting drum is six feet in diameter and five feet wide between flanges. It is fitted with a hand brake on one end, and a hand-operated friction clutch on the other end. The drum is of very heavy steel construction, with a 12-inch shaft. All the gears on the machine are cast steel with machine-cut teeth, the main spur gear being 10-inch face and the motor gears 13-inch face. The frame is made in sections for convenience in installing in the mine. The drum and large gears and the friction clutch parts are also made in two pieces for the same purpose.

The hoist is driven through a flexible coupling by a 500 horsepower direct current non-reversing compound-wound Westinghouse motor. It is controlled by a standard semi-automatic Westinghouse magnetically-controlled unit switch controller. These switches are operated from the controller shown in the illustration, the controller carrying only small currents while the main motor current is handled by the magnetically-operated switches, thus doing away with the difficulties from arcing.

This controller has an accelerating relay which prevents the starting switches from closing too rapidly and thereby prevents too large starting currents. Thus the second switch cannot close until the current allowed to flow by the closing of the circuit has fallen to a predetermined value. As soon as this value is reached the second switch closes, thereby short-circuiting a resistance section and the current rises, but the third switch cannot close until the current has again fallen to the predetermined value. This not only prevents injury to the motor from careless handling during acceleration but also insures the most rapid starting possible.

The controller also has a safety relay which opens the resistance switches in cases of excessive overload, and thereby protects the motor while running. If this relay operates while the motor is running, the motor does not stop but is automatically brought up to its full speed again. This is a particularly valuable feature in installation of this kind where the cars may strike some obstruction, as it affords perfect protection to the apparatus.

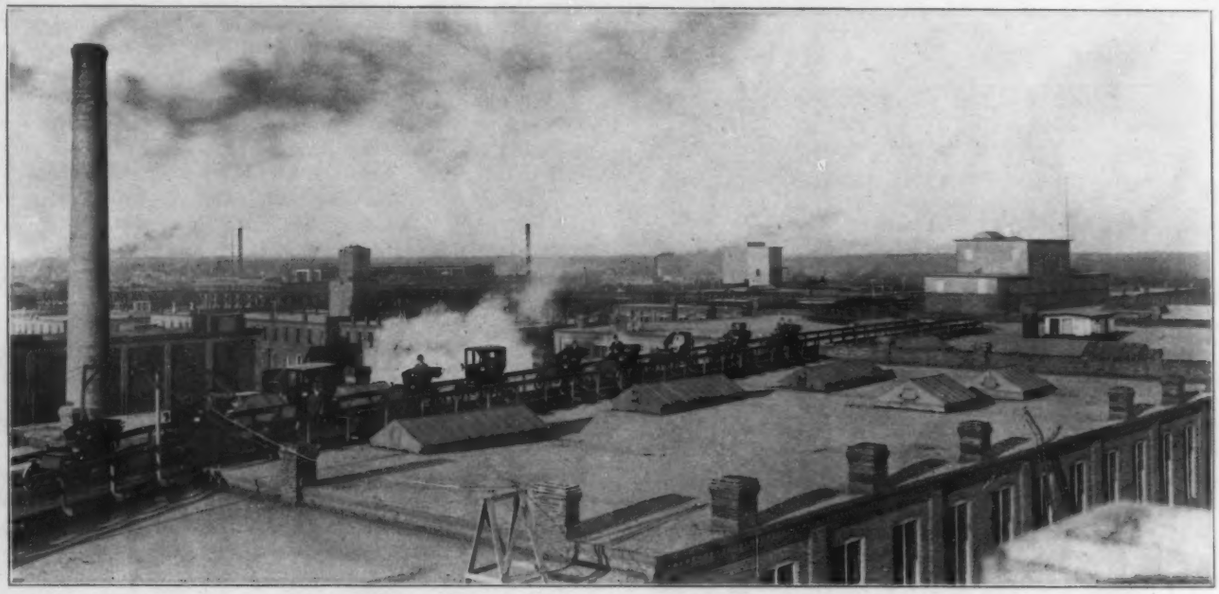
When it is remembered that this hoist is installed some 800 feet below the surface of the ground, the advantages of the electric transmission of power are evident. In no other way could this large amount of power be transmitted as economically, nor as easily. The hoist was supplied by the Connellsville Manufacturing & Mine Supply Company.

## MEETING OF STUDEBAKER BRANCH MANAGERS.

Twenty-four Studebaker branch managers attended the annual convention of the organization at South Bend. While the week was taken up with purely business matters there was a pervading spirit of elation over the fact that during the past year Studebaker automobile business has increased in volume from two million to over forty million dollars and that through the Studebaker branches are now being marketed more automobiles annually than through any other single organization in the world.

Among other incidents of the week was a tour of inspection in Studebaker electric cars through the mammoth carriage and wagon factory at South Bend. This plant covers an area about two miles square. "The buildings are mostly four and five stories high. The tour of inspection of each floor and over the system of tramways which run over the roofs and connect the various buildings covered a distance of a little more than twenty-four miles. Obviously such a trip could not be made even in a day on foot. By the use of electric vehicles, however, using the big elevators to ascend from one floor to another and then driving through the entire labyrinth of aisles on each floor, ascending to the next, and finally to the roof the trip was made in one afternoon with plenty of stops for careful inspection of methods and models.

From South Bend the party of branch managers in company with J. M. Studebaker, president; F. S. Fish, general manager of the Studebaker Automobile Company; Clement Studebaker, Col. George Studebaker, C. A. Carlisle and other members of the executive board made a trip by special car to Detroit, where the plants in which are manufactured the Studebaker E-M-F "30" and Flanders "20" cars are located, then on to Elyria, Ohio, where the Garford factory, which manufactures the Studebaker Garford "40," also was carefully inspected.



Studebaker Branch Managers on an Inspection Tour in Electric Vehicles.

The branch managers returned to their various centers of operation highly elated over the prospects for the coming year, although all equally confident that the output of the various Studebaker models, comprising though it will nearly 50,000 automobiles, yet will be less than half sufficient to supply their needs.

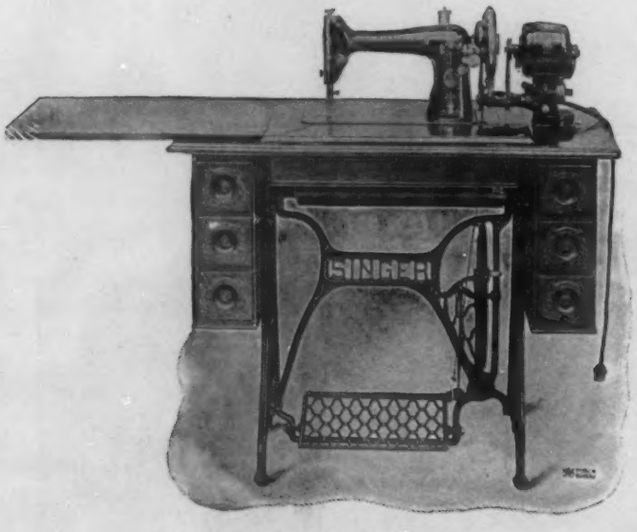
Studebaker Branch Managers.

---

Sometime ago an act was passed by the United States government authorizing the purchase of an official automobile for Hon. Joseph Cannon, speaker of the House. After the government experts had examined the claims of the various cars they unanimously decided to purchase a Studebaker. Now "Uncle Joe" possesses two of these cars and is constantly seen touring in and around the nation's capital.

## SEWING MACHINE MOTORS.

An interesting application of the General Electric small motors is to the driving of sewing machines. Cuts 1 and 2 show a motor of this type driving a sewing machine by means of the new General Electric sewing machine attachment. The design of this device is extremely simple and it can be attached to any machine of the usual construction in




General Electric Sewing Machine Motor.

a few minutes. Either a. c. or d. c. motors can be furnished for the operation of sewing machines.

The attachment comprises simply the operating switch, cable and socket, so anyone without special mechanical or electrical knowledge can install the motor. An advantage, not found in other devices of a similar nature, lies in the fact

Sewing Machine Equipped with G. E. Motor.

that no part of the sewing machine is disturbed in order to equip it with the electric motor, not even the fly wheel connecting rod. It is only necessary to remove the belt. The motor is placed so that its shaft and the shaft of the hand wheel are in the same straight line. Sewing is accomplished by turning the switch and depressing the pedal in the usual manner. This latter action removes the friction brake and increases the tension of the driving belt, the whole attachment rocking about the pivot which can be seen directly below the motor. When the pressure of the foot on the pedal is removed, a coiled spring in the base of the attachment causes the tension on the driving belt to be relieved and the brake to be applied to the hand wheel, causing the machine to stop. This method of control is so positive and simple that it is not necessary for the operator to remove her hands from her work. In case the sewing machine is so constructed that the pulley is on the outside of the hand wheel, provision has been made for changing the location of the small driving pulley of the apparatus.

When it is desired to lower the head or to place the cover on a stationary head machine, the driving apparatus can be turned to one side by withdrawing the indexing pin shown close to the table. If the machine is not to be used for a considerable period of time the complete driving mechanism can be removed, leaving only the small plate, which is not objectionable in appearance.

No special house wiring is necessary for this motor, but connection is made from any lamp socket by means of a flexible cord and attaching plug. The motor eliminates the hard work of operating the sewing machine and enables one to sew for a long period without being in the least fatigued.

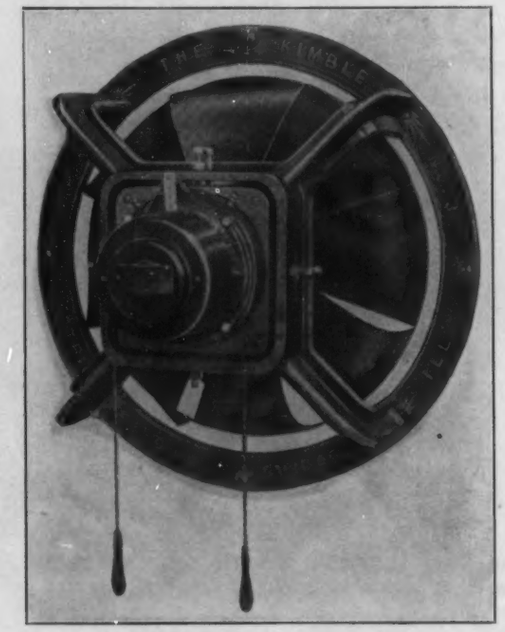
---

Direct Current Motor-Starting Rheostats is the subject of Bulletin No. 4687, recently issued by the General Electric Company, which illustrates and describes some of the company's rheostats designed for the reliable and efficient starting of direct current motors. These rheostats are not intended for regulating the motor speed.

---

## KIMBLE MOTORS.

The Kimble Electric Company of Chicago, Illinois, are manufacturing a line of variable speed, single phase electric motors for both general and specific power service, that are



Kimble Motor Driving Ventillating Fan.

particularly desirable on account of their simplicity, reliability and economy. Among those for special power service may be mentioned motors designed for printing presses, ventilating fans, electric forges, static machines, church organs, engine lathes, air compressors, etc. The Kimble motors are handled in the West by Parrott & Co., with offices in all the important cities on the Pacific Coast.

# NEWS NOTES

## FINANCIAL.

PASADENA, CAL.—Within 90 days a municipal water bond election will be held here.

NEWPORT, CAL.—The City Trustees have passed a resolution calling for an election to vote on gas and water bonds.

TOPPENISH, WASH.—Bonds to the amount of $24,500 to be used in construction of water and sewer systems have been voted at a special election.

OAKESDALE, WASH.—The special election here resulted in favor of bonds in the sum of $11,000, proceeds to be used in the installation of a water system.

SAN FRANCISCO, CAL.—A certificate acknowledging the $12,000,000 increase of bonded indebtedness of the Sunset Telephone & Telegraph Company, voted at the directors' meeting held at Martinez July 7, has been filed with the county clerk.

## INCORPORATIONS.

SEATTLE, WASH.—The West Side Cable Company, of Seattle, Wash., has been incorporated with a capital stock of $2000 by A. B. Coon and others.

SAN FRANCISCO, CAL.—Collins Pacific Coast Wireless Telephone & Telegraph Company of Seattle, $2,000,000, by B. F. Shoemaker, C. O. White, Sylvester Sullivan, C. L. Vaughan and others.

PORTLAND, ORE.—The Ballin Water Tube Boiler Company, of Portland, Ore., has been incorporated with a capital stock of $50,000 by Fred A. Ballin, Arthur Langguth and Edward G. Gordon.

SEATTLE, WASH.—The Hydro-electric Construction Company, of Seattle, Wash., has been incorporated with a capital stock of $200,000 by W. A. Insinger, J. A. Bennett, Frank MacKean, Harry F. Reynolds and J. S. Perky.

RENO, NEV.—Articles of incorporation were filed October 6th, in the county clerk's office for the Bannock Telephone & Telegraph Company, capitalized at $20,000. The incorporators are J. F. Haley, J. L. Considine and A. E. Littler.

## TRANSMISSION.

NEWPORT, WASH.—The Northern Idaho & Montana Power Company is receiving bids for the sub-station in this city.

STEVENSVILLE, MONT.—The vote on the proposition of giving a franchise to the Missoula Light & Water Company resulted in the franchise being adopted.

RED BLUFF, CAL.—The Board of Supervisors has granted a franchise to the Sacramento Valley Power Company, to construct a pole line in and through the county.

ANACORTES, WASH.—The Skagit Power Company is hauling material to a point on the upper Skagit River where it is announced a large dam and electric plant will be erected next year.

SEATTLE, WASH.—Sealed bids are being received at the office of C. B. Bagley, secretary of the Board of Public Works, for the construction of a municipal electric line in districts 1 to 9.

DEMING, N. M.—Word has just been received from B. P. Shull, who has been in Wichita, Kan., negotiating with the Western Construction Company for the installation of a central power plant at Deming, stating that the deal for the power plant is closed.

SPOKANE, WASH.—The Sylvester Engineering Company has been awarded the contract for the construction of the power development plant which will operate the Lehigh Valley Cement Company plant to be built at Metaline, on the Pen d 'Oreille River, to cost $300,000 or $350,000.

FRESNO, CAL.—The San Joaquin Light & Power Company will next year furnish power for irrigation to all the foothills along the eastern portion of this county. The order will be placed this week for a 17,000 h. p. plant to be installed in Crane Valley by next May.

SAN FRANCISCO, CAL.—Superintendent F. P. Bergen of the Sacramento Valley Power Company has placed orders for wires, insulators and poles and all equipment necessary for the immediate construction of the proposed power line between Chico and Redding. A sub-station will be constructed a few miles from Chico.

ALAMEDA, CAL.—F. P. Fisher of this city has been awarded the contract for finishing the power house of the Southern Pacific Company that is being erected on the north side of the tidal canal between the Park street and Fruitvale avenue drawbridge. His bid to finish the plant was $127,000. The power house will supply current for the operation of the passenger system to be made by the S. P. through converting its present steam roads in the east bay cities into electric lines.

OROVILLE, CAL.—Three power plants will be built by the Feather River Power and Development Company in Plumas and Butte counties. For the first one, to be located on Onion Creek, 15,000 inches of water will be dropped 1000 feet, after being ditched 11 miles. The second will be on the south branch, where 20,000 inches of water will be dropped 1250 feet, after being ditched 14 miles. The third will be on the Fall River, six miles further down, and 25,000 inches of water will be dropped 720 feet. The total development will be 86,000 h. p.

## TELEPHONE AND TELEGRAPH.

MONROE, WASH.—N. Rudebeck has been granted a franchise for operating telephone and telegraph lines from Monroe to Gold Bar.

SAN RAFAEL, CAL.—J. E. Lewis has petitioned the Board of Supervisors for the right to erect poles for a private telephone from Kentfield to Los Lomas.

JACKSON, CAL.—R. W. Barnett of Lancha Plana has been granted by the Board of Supervisors the right to erect poles in township No. 2 for the Farmers' Telephone Line.

SAN LUIS OBISPO, CAL.—J. C. Lyon, J. R. Heinrich and John Hischier have received permission from the Board of Supervisors to maintain a private telephone line along the county road in Corbit Canyon.

AUBURN, CAL.—Manager O. I. Crites, local manager of the Pacific Telephone & Telegraph Company states that his company will within the next few months put in a complete new telephone system in Auburn, which will entail an expenditure of about $35,000. All the overhead wires will be removed and only cables used.

SANTA CRUZ, CAL.—The Pacific Telephone & Telegraph Company is to build in this city a three-story building to cost $100,000. It will be located on Walnut avenue, having a 40-foot frontage and a depth of 120 feet. Executive offices will occupy the ground floor, and the operating department the second and third floors. Manager R. W. Putzker of this city says the building will be occupied by May 1, 1910.

## ILLUMINATION.

PASADENA, CAL.—Supplies to cost $1360 have been authorized for the lighting plant by the City Council.

VENTURA, CAL.—The Town Board is considering the installation of tungsten electric street lights in place of those now in use.

OAKVILLE, WASH.—The City Council has granted a franchise to W. A. Shoemaker to install light and water systems in Oakville.

SPOKANE, WASH.—The Spokane Gas Company will erect an additional $50,000 gas plant with capacity of 1,000,000 feet per day and will install several miles of 2-inch and 4-inch gas mains.

SAN DIEGO, CAL.—Sealed bids will be received up to November 15th by the city clerk for lighting the streets, avenues and parks of the city with electric lights, beginning June 1, 1910.

ODESSA, WASH.—The City Council has passed an ordinance granting a franchise to the Washington Water Power Company of Spokane to install an electric light, heat and power system in Odessa.

WHIPPLE BARRACKS, ARIZ.—Sealed bids will be received here up to November 10, 1909, for furnishing labor and material required for the construction of an electric lighting system at Whipple Barracks, Ariz.

PASADENA, CAL.—Residents of Fletcher, Electric and Bushnell avenues, in the Oneonta Park district, have submitted plans to the city trustees for the establishment of an ornamental system of street lighting on these avenues.

SAN BERNARDINO, CAL.—The Southern California Edison Company will furnish Highland with electricity. The Board of Supervisors has accepted the company's bid of 70 cents per 16 candle power lights and $1.40 for 32 candle power lights.

EUGENE, ORE.—The Junction City electric light plant has been purchased by the Northwestern corporation. It is the intention of the company to abandon the small dynamo and supply the city with light and power from the Eugene plant and later from the big plant now in course of construction on the McKenzie River.

## TRANSPORTATION.

PASCO, WASH.—The Walla Walla Traction Company is seeking terminal facilities here.

ROSEBURG, ORE.—The contract for the erection of the electric railway by Kuettner & Haas has been signed.

BELLINGHAM, WASH.—Judge E. M. Day is promoting the proposition of building an electric line from this place to Lyden.

WALLA WALLA, WASH.—According to Chief Engineer C. W. Sansome, several surveying crews will be put in the field on the Dayton to Walla Walla traction line in the near future.

ALBUQUERQUE, N. M.—The City Council has passed an ordinance granting the promoters of the Highland electric railway a right to build and operate an electric line and power plant.

CHEHALIS, WASH.—The Twin City Light & Traction Company is endeavoring to secure a contract to build the electric line connecting Chehalis and Centralia. The plans and specifications are ready.

SALEM, ORE.—The Portland General Electric Railway is planning to build a barn on the quarter block recently purchased by them at Front and Chemeketa streets. The barn will cost $20,000 or more.

ODESSA, WASH.—It is reported that Odessa is to have an electric line which will run from the proposed Harrington-Sprague road 20 miles east of town. The Washington Power & Light Company has the franchise.

NELSON, B. C.—The people of this place have voted to authorize the city council to guarantee the bonds of the street railway company. It is probable that the cars will be running by January and that many extensions will be made.

SANTA BARBARA, CAL.—Owners of the Santa Barbara electric railway are planning an extension through Montecito Valley to Carpinteria. This line would be a part of the interurban line connecting Los Angeles and Santa Barbara.

FRESNO, CAL.—The Fresno Traction Company has asked the Supervisors for a franchise for a double track beginning on First street near the north line of Tulare avenue, connecting with the tracks thereon and running south along First street to the line of Kern avenue.

GLENDALE, CAL.—The franchise for the right of way along Fourth street between Glendale and Brand boulevard, which has for the past few years been held by the Pacific Electric Company of Los Angeles, has been abandoned by that company and a transfer of franchise will probably be made to E. D. Goode.

## WATERWORKS.

SEATTLE, WASH.—The Council has passed resolutions providing for water mains in Howard and Minor avenues, north, and also in Second avenue.

CONCULLY, WASH.—D. J. Cummings of Riverside, Wash., has applied to the County Commissioners of Okanogan county for a franchise to install a water system.

CHICO, CAL.—The foundation has been put in at Paradise for a 50 foot tower to support a 10,000 gallon tank, from which will be drawn the water supply for the domestic purposes of that community. A ten horse-power engine will operate the pumping plant.

SANTA ROSA, CAL.—The Board of Supervisors has passed an ordinance granting to Charles W. Gregg a franchise to construct, maintain and operate water pipe lines over the county roads leading from the city limits of Petaluma to Rose Hill district school house.

SACRAMENTO, CAL.—The Sacramento County Water Company, incorporated with a capitalization of $2,000,000, with headquarters in San Francisco, today filed application for dissolution. The directors of the company are: John A. Britton, Henry Bostwick, A. F. Hockenbeamer, Joseph C. Love and D. H. Fonte.

PORTLAND, ORE.—The city water board has ordered the immediate construction of a 12-inch water main to connect the high pressure reservoir at Mount Tabor with the four-inch wood mains of the Woodmore Water Company, of which George W. Brown is president. The estimated cost of connecting main is $6350.

LOS ANGELES, CAL.—By an agreement entered into by the advisory committee of Los Angeles aqueduct and L. C. Brand, representing San Fernando Mission Land Company and ratified by the Board of Public Works, the city of Los Angeles will soon acquire the block of land necessary for the construction of two big water reservoirs at the head of San Fernando Valley.

PORTLAND, ORE.—The contract for laying the water main in Weilder street from Seventeenth to Twenty-fourth, has been awarded to the Pacific Bridge Company, their bid being $3897.50. Other contracts for mains on East Thirty-third street from Clinton to Brooklyn, and on East Tenth street from Alberta to Going, were awarded to the Oregon Iron & Steel Company, the total amount of the bids being $3620.36.